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JOURNAL OF ELECTRICITY

FOUNDED 1887

ROBERT SIBLEY, Editor — CLOTILDE GRUNSKY, Associate

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OPTIMISM PREVAILS IN THE WEST

THE recent announcement of the Great Western Power Company that it has sold its $7,500,000 in securities and will commence immediately on the installation of the first unit of 40,000 kilowatts that ultimately will total 120,000 kilowatts in capacity, upon the picturesque power site shown to the left, constitutes but one of the several mammoth announcements that have been recorded in the Journal of Electricity since the new year concerning new power development in the West. Others are the Southern California Edison Company, the San Joaquin Light & Power Corporation, the Sierra & San Francisco Power Company, and the Utah Power & Light Company.

The Great Western Power Company has sold its $7,500,000 and will begin immediately the development of 40,000 kilowatts in its new plant, ultimately to have 120,000 kilowatts capacity.

The Southern California Edison Company, with its recent $16,000,000 securities issue disposed of, is starting at once on a development that will represent an outlay of $45,000,000 during the next ten years, merely for installation expense in its Big Creek development.

Recent bond issues have been successfully floated by two of the great companies of the Northwest—and plans are under way for developments in that region.

According to Major Sever of the War Industries Board, the program in California alone for the next five years demands the expenditure of $80,000,000.

Not only do the plans of the power companies throughout the West reflect an optimistic spirit, but a survey of business conditions on this coast, such as appears later in this issue, indicates that manufacturers and wholesale merchants look forward as well to a period of great prosperity close at hand.

MAR 25 1919

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JOURNAL OF ELECTRICITY

DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

Volume 42 SAN FRANCISCO, MARCH 15, 1919 Number 6

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THE UNIVERSITY PRESIDENT—WHAT IS NEEDED

The fact that the twenty thousand alumni of the University of California, now the second largest university in America, await with breathless interest the decision of the Board of Regents as to who shall be the next president of this great institution, leads thoughtful men to ponder seriously the ideals that should pervade the new university in this day of world readjustment. We must agree with Theodore Roosevelt, in his address in the Greek Theatre at Berkeley in 1911, when he said that our great universities, while paying heed as they ought to turning out men and women who will be of practical service in the life of the state, should also remember that our national life will be hopelessly one-sided unless we also steadfastly turn our attention to developing the kind of men and women who shall be masters in exceptional kinds of work; unless in addition to vocational training we have a cultural training which shall fit men to do the highest and best work in the fields of literary and artistic endeavor, and in the field of pure science,—of abstract science, of science not pursued with any expectation of making it immediately remunerative.

But to meet the needs of the hour the new university must be prepared to give even more. The great crying need of the hour is for vision — vision to see beyond the jealousies, the hatred, the avarice, and the entanglements due to petty considerations of race, religion, or localized community of interest — vision that will offer more of hope and courage to humanity as a whole. On the Pacific Coast where the same waters wash the shores of the new civilizations that wash the shores of the oldest civilizations of the world, perhaps this need is even more emphatic.

Hence the man to undertake such a task as that of the presidency of the University of California must be one familiar with the ideals of the Eastern civilization, yet whose very heart throbs pulsate with the life-giving energies of our great West and what it has in its native values to offer of helpfulness to humanity. He must be a man of courage — a man of conviction — a man of vision — such characteristics may indeed be said to make up the scholar in the highest sense of the word.

And no other type of man will be satisfactory to the people at large, for such a man is needed to direct the affairs of this, one of the world's greatest and most influential institutions of learning, and thus make possible the fullest contribution the West may have to offer in giving of its best toward shaping the destinies of the world.

The Master Electrician

Legislation is under way in several commonwealths of the West concerning the enlargement of the jurisdiction of inspection. The bill now before the California Legislature calling for the licensing of the master electrician under the jurisdiction of the California Industrial Accident Commission should receive careful and thoughtful consideration. This bill as drawn will not disturb the inspection departments within incorporated cities, but will of course necessitate all electricians having a certificate of competency before approval of work performed will be issued by the Accident Commission.

A movement such as this which looks toward a state-wide uniformity in electrical installation under competent inspection and approved workmen is to be commended.

It is estimated that the yearly fee of $25.00 per master electrician's certificate issued will, from the 600 eligible master electricians in the State of California, return an annual sum of about $12,500. The operation of the enactments of the bill will entail an annual expenditure of approximately $125,000. It is proposed to raise this amount by assessing each unit installed in amounts ranging from $0.60 as a minimum to $10.00 as a maximum. Figured on the total cost of installation the tax represents about one-half of one per cent of the cost of installation.

On the whole a movement such as this looking toward state-wide standardization is unquestionably a leaning in the right direction. It merits the thoughtful and earnest consideration of all branches of the industry. If any defects are to be found they should be adjusted so far as possible so that the industry as a whole may stand back of the movement.

Publicity for Utility Service

In these days of educational enlightenment by publicity it might be well here to call attention to one of the splendid points in utility service that the public has entirely lost sight of — namely, the almost inconceivable wonders that have been wrought in maintaining continuity of service. Few realize its magnitude and little appreciation is shown as a consequence by the public at large. The motion picture is perhaps one of the best methods of reaching the public mind. One thrilling and extremely instructive setting could be staged by showing the interior of a power house during a storm. Very few people have any idea of the effort made to prevent shut-downs or how busy an operator must be under such conditions, with calm nerve and steady hand. Real life and intense interest can be brought out by picturing the circuit-breaker flashes and the line kick-outs, or an overloaded rotary converter so far out of phase (by the synchronoscope) that the operator, to use his own language, has to "kick" it back a cycle or sometimes two or three. Only those who have witnessed such scenes can picture the thrill that one experiences at such times.

This is only one instance of the many possible movie scenes that could be used to give the public some conception of the modern demands for continuity of service. The effect of such a setting in creating favorable public opinion and making better-satisfied consumers should not be overlooked.

New Conditions Confronting Our Commerce

One factor that must be remembered by electrical men in casting their vision across the Pacific with a view toward foreign interchange is the all-important question of credit.

During the stirring war period foreign orders have largely been taken cash paid in advance. It must be remembered that Great Britain and other large exporting countries have built up their supremacy by extending long time credits. In many South American countries, for instance, cash means payment within six months while credits frequently extend over a two year period.

The splendid new American banking branches that are fast being placed abroad will do much to alleviate the credit situation but the business house must be prepared to face the long time credit situation.

The Waste of the Small Order

The waste of the small order coupled with the inopportune or rush order constitutes an evil that must bear continual watching from all branches of the industry. As an instance of how the small order affects the selling price, one prominent electrical supply jobber states that he finds that the parcel post delivery necessitates an increased cost price of at least eight per cent.

The inopportune or rush order on the part of the contractor-dealer and other branches of the industry can in large measure be obviated by more thought and care in planning ahead the work to be undertaken. The early Monday morning rush order upon the supply jobber can completely be eliminated by such care and forethought.

While these matters seem trifling in themselves they are nevertheless of great importance in the aggregate.

Water Powers of the World

The preliminary report of the water-power committee of the Conjoint Board of Scientific Societies in England has just recently been issued. According to this report the water powers—developed and undeveloped — of the leading countries of the world appear in the following order.

The power now being used in the various countries of the world is estimated to be of the order of 120 million h.p., made up approximately as follows:

World's factories, including electric lighting and street railways	75 million h.p.
World's railways	21 million h.p.
World's shipping	24 million h.p.

This includes all steam, gas, and water-power.

Of the 75 million h.p. used for factories and general industrial and municipal activities, a rough approximation of the most probable distribution would appear to be:

United Kingdom, 13 millions; Continental Europe, 24 millions; United States, 29 millions; British Dominions and Dependencies, 6 millions; Asia and South America, 3 millions.

An estimate by the Dominion Water-Power Branch of the Canadian Department of the Interior, outlines the hydraulic situation of the various countries, as follows:

Country.	Population (latest available figures).	H.P. available (1915 estimate).	H.P. developed (1915 estimate).	Per cent utilized.
United States	92,019,900	28,100,000	7,000,000	24.9
Canada	8,033,500	18,803,000	1,735,560	9.2
Austria-Hungary	49,418,600	6,460,000	566,000	8.8
France	39,601,500	5,587,000	650,000	11.6
Norway	2,302,700	5,500,000	1,120,000	20.4
Spain	18,518,100	5,000,000	440,000	8.8
Sweden	5,521,900	4,500,000	704,500	15.6
Italy	28,601,600	4,000,000	976,300	24.4
Switzerland	3,742,000	2,000,000	511,000	25.5
Germany	64,903,400	1,425,000	618,100	43.4
Great Britain	40,831,400	963,000	80,000	8.3
Russian Empire	182,182,600	20,000,000	1,000,000	5.0

From this it appears that between 15 and 16 millions of the world's industrial horsepower is at present developed from hydraulic resources. The following table, according to the Electrical Review of London, shows approximately the hydraulic power developed in the various regions, and also the ratio of this to the total industrial horsepower, excluding railways:

	United Kingdom.	Continental Europe.	United States.	Colonies.
Millions of h.p.	.08	6.5	7.0	2.0
Percentage of total industrial h.p.	0.6	27.0	24.0	33.0

A cursory examination of this information shows that the United States of America is blessed to a greater degree than any other nation in undeveloped water power. By combining these possibilities with those of Canada to the north it is seen that the

northern part of the North American continent has a greater total by far in undeveloped power resources than all the countries of Europe combined, barring of course, Asiatic Russia.

It is interesting to note in passing that the combined power for shipping and for railways of the countries as listed is 45 million horsepower as compared with 75 million horsepower used in the world's factories, including electric lighting and street railways—slightly half as much. On the other hand the sad thing to note is that the sum total of power now used in the world is of the order of 120 million horsepower, while the complete undeveloped water power of these nations is but 100 million horsepower.

Hence even the most optimistic viewpoint of the ultimate utilization of water power in the industries shows even at this early date that there is not sufficient undeveloped water power existent to carry on the industrial life of the world even though all of this power could be economically developed.

Some Difficulties Confronting Grape Syrup

Due to the importance of the grape industry and the possible effect prohibition will have upon this great agricultural asset of the West, in whose manufactured products electricity is playing an ever increasing role of usefulness, the Journal of Electricity early this year undertook a special investigation of the possibilities of marketing grape syrup. The University of California through its agricultural department quite recently issued Bulletin No. 303, in which some important investigations were disclosed. Editorial comment was made in the Journal of Electricity for January 15, 1919, calling attention to the splendid possibilities of grape syrup—a new undertaking that might grow into a cast industry of over four million dollars in value of the raw product.

From an investigation among prominent manufacturers of molasses and syrups of the Southern States undertaken by the Journal of Electricity, it would appear that there are only five things to consider in a syrup or molasses—flavor, color, sweetness, density and baking or cooking properties. A person is not in a position to judge any of those qualities unless he has a sample to work on. Hence it is very important that samples be sent to a widely distributed number of districts throughout the nation.

Corn syrup owes its popularity to its mild flavor and low cost to the consumer. Maple syrup, with its delicate flavor, appeals to the wealthier consumers, but the volume of sale is limited by the high price. In the South pure sugar cane syrup has a larger sale than corn syrup and maple syrup combined. This cane syrup retails ordinarily at about $1.00 per gallon.

Just how grape syrup would work into the syrup family is hard to tell—this can only be determined after considerable study. It probably will take several years to develop a large volume of business on a new grade of syrup. Advertising alone will not create a demand. Advertising is like artillery which reinforces the infantry, or salesmen who interest the retail grocers. Retailers require a profit of about 30%. The wholesale grocer will not handle a product until the manufacturer creates a demand from the retail grocers, and the jobber requires a profit of about 15%.

A new product often requires house to house canvassers and demonstrations. It is not much use to advertise until a reasonable distribution has been obtained among the retail grocers. One manufacturer states that nearly a half-million dollars was spent advertising his molasses in national magazines before there was any distribution, and those who were interested by the advertisements were unable to secure the syrup from their retail grocers.

It would seem, then, an unwise undertaking to attempt to put grape syrup on the market in volume in an effort to save this year's production of grapes. If some other outlet can be found for most of this year's grapes and only a comparatively small amount of syrup produced this year, the product could be tested in, say, one hundred markets scattered over the United States, and its future could then be figured out.

In this connection, the present market prices of pure sugar cane syrup are interesting and instructive. Pure cane syrup, which the planters were selling to the dealers around 70 cents per gallon this last summer for future delivery, is now selling at about 50 cents. The planters' price for syrup to dealers is normally about seven times the price of yellow clarified sugar. Bearing these figures in mind, one may formulate a comparison with the prospective cost price on grape syrup. The price of cane syrup should be considered as well as the first-hand cost of maple syrup.

These figures should not discourage western enterprise from proceeding further in this helpful investigation. They give conservative statements of what must be overcome to successfully market this splendid product, and as a consequence a bed-rock foundation is laid upon which western genius will unquestionably successfully build.

THE NEW JOURNAL SERVICE: Electricity as an aid in increasing port facilities for the handling of cargoes will be treated extensively in the Journal of Electricity for April 1, 1919. This subject is of vital interest not alone to the contractor-dealer, to the central station, to the jobber and to the manufacturer—vast as may be their interest—but to the upbuilding of the commercial supremacy of the West it is of prime importance. This interesting survey hence will prove a new Journal service of great timely importance. Beginning with the April first issue, two important series of articles will be featured, both of which are announced in this issue. A course in "Fundamentals of Electricity" will be presented in conjunction with the extension department of the University of California which will be of interest in the individual articles, and as a whole a complete review of the basic elements of the science. A series of papers on "The Business Library" will also commence in this issue, which will take up the problems of organizing records for the small business as well as the large. Remember that the April 15th Convention Issue will feature all the papers of the coming Pacific Coast Section N. E. L. A. Convention.

THE BUSINESS SITUATION IN THE WEST

BY W. M. DEMING

(Should you hesitate to expand your business? Are times to be good or bad? Will prices go down suddenly? A survey of the business outlook in the West by the general manager of the Journal of Electricity as presented befor the recent Jobbers' convention at Del Monte. A group of letters from manufacturers judging the situation as they see it supplements the survey.—The Editor.)

The business situation is changing rapidly—almost from day to day—and there are so many different points of view from which the subject must be considered and so many problems—international and otherwise—which, while seemingly irrelevant, have an important bearing on business conditions in all sections of the United States, that it is difficult to express or even form a reliable and concise opinion on the subject.

Manufacturer's View of Situation

In order to give some idea as to the present day outlook in the electrical industry a telegram was sent to a number of representative manufacturers in various lines, requesting their views. The replies are not only varied but interesting and form an index to the wide diversity of opinion among business men who are unquestionably in close touch with and watching the situation carefully.

Era of Prosperity

In the first place, there seems to be no question whatever but that the United States is in a position to enjoy the greatest era of prosperity in its history, provided we grasp the opportunity. How soon we may begin to derive the actual benefit of this prosperity depends to a large extent, if not entirely, on what steps we take to hasten its arrival.

The sudden ending of the war found us almost as unprepared to readjust our business to a peace basis as we were when suddenly drawn into the conflict, but there can be no question as to our ability to handle this problem with the same rapidity, efficiency and thoroughness shown in mobilizing our resources for war.

It is necessary, however, to apply to the present problem the same enthusiastic unanimity of purpose displayed in helping to win the war.

Danger in Pessimism

The pessimist is as dangerous a factor in the present business situation as the pacifist was a few months ago, for there is a psychological factor which plays a very important part in the business world, and economic conditions must not only be considered as they are but as other people think of them as well.

Although we are in a period of temporary uncertainty, or hesitation, the situation will appear alarming only so long as we wait to see what the other fellow is going to do.

Building and Labor Situation

The labor situation may doubtless be considered the controlling factor of business today. There seems little prospect of any radical reduction in wages as long as the cost of living remains at its present level; in fact, the Department of Labor predicts a shortage of several million men by late spring.

There seems to be a tendency to delay building operations in the hope that prices may drop materially, but there are many sound arguments against the possibility of any sharp decline—the most general opinion being that prices will show but little change for six months or more, at least.

On these detail points we have no precedents to guide us, and one guess is as good as another, but we can and should continue to show our loyalty by acting, preaching and urging optimism. The return to normal business life will not be accomplished by worrying over what may happen, but can be accomplished by doing the tasks at hand and establishing, by our own acts and example, a strong confidence in the certainty of business prosperity being close at hand.

REPORTS FROM MANUFACTURERS

Representatives of one of the largest manufacturers of electrical apparatus and material advise that although public utilities in some sections of the country are from three to four years behind their normal expansion, there will be relatively little activity in either the lighting or railway field in the direction of further extension, for the present at least. However, there seems to be considerable activity among industrial plants. A large number of them are planning extensions and consulting engineers are particularly active at this time. A good business in household appliances is anticipated during the coming year. High costs and difficulty in securing additional capital at reasonable rates is retarding general building operations.

The Bryant Electric Company find the outlook for this coming year a bright one:

The Bryant Electric Company is very optimistic regarding the business outlook for 1919. Our circumstances may or may not differ from those of other firms whose product is handled by electrical jobbers throughout the country. At any rate, while our business during 1918 was almost wholly direct or indirect war work, it was likewise almost wholly made up of our standard catalogued product which was in large demand in contonments, navy yards and industrial establishments. Therefore, a return to peace conditions does not in our case involve anything even approaching a revolution in our factory processes. We shall be able to continue making the same character of goods that we have for years past. The question we are asking ourselves, and the question which our distributors are asking of us, is what demand is there going to be for Bryant standard product during 1919. Again we are most optimistic. It is over two months since the Armistice was signed and the anticipated slump has not come. This is doubtless due to the fact that building operations which were halted at the beginning of the war have already gone forward. Other buildings of the character which can or must be carried through regardless of the cost of building construction will doubtless start just as soon as uninterrupted weather conditions are assured. To sum up, therefore, we would say that business prospects are brighter and the probability of lower prices more remote than they seemed two months ago.

While there have been some slight reductions in the prices of raw material, they are offset by the continued in-

crease in the labor rate. Continued strikes seem to indicate that the present rates of labor will be continued and the high cost of living maintained for some time to come.

F. V. BURTON,
General Sales Manager,
The Bryant Electric Company.

Pass and Seymour express themselves as follows in a telegram:

We feel very optimistic regarding prospects for 1919. We realize conditions have changed from a buyer's to a seller's market and that it will be a poor year for so-called order takers, but a good one for well regulated sales campaigns. We expect market prices to remain staple throughout the year, labor affecting this more than the price of raw materials. Whatever slight setbacks occur are only temporary disturbances in a long period of general good business.

PASS & SEYMOUR, INC.

The American Conduit Manufacturing Company express themselves as in favor of an optimistic outlook:

We are in a waiting market. The war demand is ended and the peace demand has not yet developed. Just as it was patriotic to refrain from carrying on general construction work during the war, it is now a matter of patriotic duty to immediately start all kinds of construction work. The general shortage of dwellings and all sorts of commercial buildings has brought about congested living conditions and has placed many obstacles in the way of properly conducting business. The country needs not only dwellings and buildings but good roads, bridges, power plants, water power development, and parks. At the very moment that the problem of the unemployed takes on a most serious aspect these two forces must be brought together, not only for the benefit of labor and our national morale, but also for the benefit of capital which, if courageously employed at this particular time, will reap a tremendous reward long before the demand for these new developments has been satisfied. Therefore do not wait for lower prices—act now.

THE AMERICAN CONDUIT MFG. CO.

The National Metal Molding Company looks forward to prosperity after some delay due to labor readjustments:

Business is at present facing, in a national way (necessitating the slowing down of activities), the problems of labor adjustment from war to peace basis, settlement of the principal problems before the Peace Congress, and the flotation of the forthcoming fifth governmental loan. These problems may take most of this year to solve. In fact, it may run into the coming year of 1920.

The brighter side of the picture reflects the following conditions:

The United States is emerging from the most disastrous war in the world's history as a creditor instead of a debtor nation, with a per capita wealth having increased during the war period nearly fourfold, and with the acquisition of the most friendly feelings towards us of all the allied nations and, in fact, all nations of the earth, and a recognition of the wonderful and astonishing achievements of our nation in the participation in the world's conflict.

During the war period, building construction in all fields of activities in this country, except manufacturing and sheer necessities, compelled to await the termination of the war, is now anxiously awaiting the readjustment of material and labor costs to initiate the greatest building era this country has ever known, and with the accumulated wealth and assets, and fifteen billions a year agricultural production, no one could safely predict other than a period of great prosperity in this country, beginning in the near future.

C. E. CORRIGAN,
National Metal Molding Company.

The Allis-Chalmers Manufacturing Company is impressed with the opportunities for foreign trade:

Our president, Mr. Otto H. Falk, in attempting to forecast business outlook expresses the opinion that until such time as conditions have become more settled, there will not be a great revival of business. Reports received as to the general situation indicate that many industries have plans well developed for needed improvements which will necessitate extensive machinery installations. Purchasers however are holding back until conditions become more settled.

The government's policy in legislative matters will have much to do with determining the early revival of business. We believe that with proper effort, American manufacturers of power and electrical machinery can participate in an extensive foreign trade.

C. E. SEARLE,
Allis-Chalmers Manufacturing Company.

The Benjamin Electric Manufacturing Company is in the process of changing from government to peace time work, but feels that once started, American business is going to go with a rush:

Conditions with us are the same as in many other lines of industry. We were on government work for about 80 per cent of our capacity when the armistice was signed; we had completed some stuff and had cancellations on some orders, so that now we are in the process of readjustment. Like many other industries, our business is not rushing; at the present our overhead is a little heavy.

We find that the harder we hustle, the more business we get. It seems to fully establish the fact that this is rapidly becoming a buyer's market and that the seller will have to bestir himself to get business. In other words, the business can be stimulated by strong selling effort. As spring advances, building operations are resumed, and some other problems settled of a more or less national interest, we expect our business to assume proportions equal to our facilities. We can see no reason to express anything other than the greatest optimism as to the future of our business.

Speaking generally of American business, we don't think there is anything that can hold us back, and once we get started we are going to go with a rush. The more courage we possess, the greater energy we use, the more we are going to accomplish, and it is just in that state of mind that we must attack these problems to be successful.

BENJAMIN ELECTRIC MFG. CO.

The Hurley Machine Company is making plans for a big business in labor saving devices:

First, we do not believe there is going to be any reduction in the price of our product this year. Material is not going down very fast and labor will remain the same or go up. We find it is just as hard to get good mechanics today as it was a year ago. Of course, there is a lot of labor that you would not have to pay so much for, but the best labor still demands a good price.

Post Civil War Conditions

I was reading some facts the other day in regard to the reconstruction period during and after our Civil War. From 1860 to 1865 the business of the north was as prosperous as business in this country from 1914 up to the present time. During both periods business operated on a rising market. From 1865 to 1873 American business operated on a falling market, enjoyed the greatest prosperity it had ever experienced up to that time. At the conclusion of the Civil War prices began to decline and wages continued to increase for seven years after the conclusion of the war. In the period from 1860 to 1880 the high peak in prices came in January, 1865, and from then on there was an almost uninterrupted

decline, the index number for 1880 standing at only 4% above the level for 1860. Wages on the other hand rose more slowly during the war period and continued to rise generally until July, 1872, seven years after prices had begun the long decline. The margin of gains for the workers, the net increase in real wages maintained at the close of the 20 year period, can be roughly measured by the indices, which show a gross gain of 38% in wages in 1880 over the 1860 level, against a net increase of 4% in wholesale prices.

Cost of Living Must Decline

In other words, the cost of living must decline before wages can decline or be permitted to decline. About 60% of the cost of the average commodity sold to jobber or dealer is labor cost. The remaining 40% is material, transportation, etc. costs. Under such conditions, costs of material will have to decline materially before such decline can radically reduce costs. At present labor costs are as high, if not higher, than they were before the signing of the armistice, except in those plants where the labor cost per unit of production has been decreased by greater volume of business and greater labor efficiency. Materials, in many cases, have increased instead of decreased since November 11. These conditions I believe the jobbers and dealers should know.

Women in Business Meant Household Appliances

According to a report of the United States Department of Labor about 2,000,000 women were employed in this country in factories and plants operating to full capacity on direct war work. This figure of 2,000,000 women does not include women employed in factories and plants producing those commodities which, during the period of the war, were classed and called "less essentials." The shifting of woman labor from the home to the factory and to business, in general, was by no means as great in this country as it was in England or France, but the movement was great and large enough to create such an acute shortage of domestics and of household servants that the washing machine industry and business as a whole advanced with remarkable strides. The shifting of woman labor simply swamped the producing capacity of almost every industry producing household labor saving devices. We were unable to meet the enormous demand, but we saw it coming and built a large factory so as to be prepared for it, and by August, 1918, this factory was organized so that we could begin to give our customers reasonable service.

The signing of the armistice has not in any way decreased the demand for washing machines for household use. The shortage of domestics, household servants and of woman labor in general is as acute as ever. The United States Employment Service is continuing its work of placing woman labor just as it did during the war. During the week ending December 21st, it placed 14,943 women. These labor conditions, of course, serve to continue and strengthen the demand for washing machines.

Women Learn to Handle Machinery

We believe that the women who entered the factories during the war and who will now return to home and household duties have learned the full value of labor saving devices. They have learned that the office, factory and railroad in this country is equipped with the latest modern labor saving devices. They have learned the value and utility of such devices, and they have learned how to use them. This knowledge gained from actual practical experience, will be taken into every home into which these women, who did so much for their country during the war, enter either as housewives or domestic servants. No one can forecast the enormous demand for household labor-saving devices which will exist in this country for the next five or ten years as a direct result and heritage of the war.

A Favorable Situation

We believe that the jobbers and dealers should put themselves into a position to "cash in" on the favorable situation. The woman who during the war carried on her work as housewife, in many cases did so without the aid of servants. The shortage of domestics and the high wages they commanded made it necessary, and still makes it necessary, for many housewives to do their own washing and ironing. Housewives who have been doing their own work to release labor for direct war work are the first prospects for sales of washing machines and ironing machines and vacuum cleaners. Those women who may now return to the home and to household duties, after taking an active part in the business world, will demand the same sort of labor-saving devices which they found in the office and the factory.

The jobber and dealer should get ready to take care of this demand. I am sure that their sales on washing machines and other labor saving devices will be larger in 1919 than ever before. We are making all our plans accordingly, and have bought our stock and made our contracts for material believing all these things will come about.

NEIL C. HURLEY,
President Hurley Machine Company.

J. G. Pomeroy believes in looking the situation in the face:

It looks to me as though temporarily for the next four or five months business would be at a standstill awaiting price readjustments. Both the jobbers and manufacturers must realize that they made a handsome profit for three or four years on an up market, and that they must take a loss on a down market, and the sooner that these interests come to realize that prices must go down to a normal basis the sooner, in my opinion, will business start.

There is a great deal of talk about labor readjustments. In my opinion, labor is not over paid considering other prices, and especially laborers' living. If at the present market for labor labor would become efficient, the present wage scale could be maintained.

J. G. POMEROY.

The Westinghouse Electric and Manufacturing Company predict progress in railway electrification and electrically driven ships, together with great activity in water power development:

The disturbed markets and the general feeling of uncertainty which permeates the commercial atmosphere make it incumbent upon the electrical manufacturer to analyze the electrical field with more than usual care in order to determine what are the more important developments which may be expected within the reasonably near future, so that, knowing what to look forward to, he may shape his course accordingly and so plan his commercial policy and organization as to obtain his fair share of the business inherent in these developments. The following appear to stand out as deserving of first consideration:

Electrification of Steam Railways

On account of the increased tonnage which may be handled over steep grades by electric locomotives and because of their lower operating and upkeep costs, independence of severe weather conditions as well as the economy of fuel which can be effected by their use, it is generally agreed among electrical and railway engineers that the next few years will see the electrification by many of the more important railways of those portions of their lines located in mountainous sections of the country where grades are steep and hauling conditions difficult. The large amount of additional capitalization required will cause this development to be brought about gradually and make it dependent very largely on the money market. This is, in its entirety, of

paramount interest to the electrical manufacturer both on account of the magnitude of the undertaking and because he will be called upon to furnish practically all the apparatus involved which will include generating equipment, heavy traction equipment, transformers, trolley and transmission line material, conversion equipment for sub-stations and switching equipment for both main power houses and sub-stations.

Application of Electricity to Ships

For ship propulsion just as for the driving of large generators in central stations, the steam turbine has practically superseded the reciprocating engine. America, with upwards of 200 shipbuilding yards, is leading the world in the construction of new vessels, which activity has resulted in an unprecedented demand for large turbines, motors and switch gear on the heavier ships which are electrically driven, and of geared turbines on the more moderate sized vessels—all of which are of primary interest to the electrical manufacturer. Switching equipment, motors for auxiliaries, and lighting fixtures and equipment are also a part of the electrical manufacturer's product which must be supplied to each ship. At present the turbine manufacturing departments of practically all the electrical manufacturers are being taxed to their utmost to supply the demand incident to this shipbuilding program, and all indications point to a continuation of this condition for many years hence.

Development of Water Powers

On account of the very general popular agitation of this subject, there is every likelihood that the government will remove many of the restrictions imposed upon the development of water powers, thereby assisting in the much talked-of program for the conservation of fuel and affording additional relief to our transportation systems which already overburdened, are called upon to carry large amounts of coal. This development will involve the building of large generating and switching apparatus and the construction of high tension transmission lines with attendant sub-stations containing the usual conversion (transformers, synchronous and rotary converters) and switching apparatus. All of this equipment is fundamental to the electrical manufacturer. The extension of low priced power will encourage the further use of electric furnaces and reheating and annealing ovens, as well as all other industrial applications of electricity which are dependent on relatively low priced electrical energy. The wider use of electrically driven household and heating appliances will, of course, be encouraged, thereby furnishing an additional market for the products of not only the large but also the smaller electrical manufacturer.

These developments, of course, furnish to the electrical manufacturer and distributor a large field for the sale of conversion and switching equipment as well as motors for the handling of the innumerable auxiliaries required in electrochemical and electric furnace plants. Related to all this is the machinery required for the electrical handling of the raw materials in the mines and the extensive application of electric drive in the various crushing, grinding and refining processes so widely involved in metallurgical developments.

The recovery of ore and cement dust by means of the Cottrell processes is furnishing a market for a considerable amount of special electrical machinery which is rapidly being standardized. All electrochemical developments have been increasing rapidly and give promise of much wider application throughout all our industries.

Developments in Electrical Transmission of Intelligence

A vast amount of detail apparatus which ordinarily comes under the heading of electrical supplies will be required for the developments in the fields of the wireless telephone and telegraph, the automatic telephone exchange and multiplex telephony. Those electrical manufacturers specializing in the manufacture of this apparatus, as well as those branches of other electrical manufacture which have to do with meters, instruments and supply apparatus will be taxed to meet the demands for the equipment necessary for this development.

It is self-evident to anyone who has given this subject even a moderate amount of consideration that the ultimate possibilities for the domestic sale of electrical apparatus loom larger than ever before.

C. G. SCHLEUDERBERG.

A representative of The Crocker-Wheeler Company quotes optimistically as follows:

The best illustration for future business which I can cite is from an article of Charles S. Calwell, President of the Corn Exchange Bank, Philadelphia, which reads as follows:

"It is natural for business to hesitate under present conditions. But do not let us hesitate too long nor expect in the near future to see prices back to a pre-war basis.

"Prices will decline, but remember for four years, as every one knows, the principal nations of the world have been producing little for general use, consuming and destroying much. Even today in many countries little is being made, much is still being destroyed.

"American business men solved the problems of war; the problems of peace should not scare us. Prepare for business."

Now as to the California situation: From what I learn I believe California is in a better position than ever before, due to the fact that the world will need for years to come California products in large quantities. It appears to me that California takes no chances to increase its productions and that means business, but my opinion is that the only way to get this business which is coming these days is to go after it, that is, creating business and bringing in business instead of waiting for business to come in.

A FEW DON'TS FOR ORIENTAL TRADE

The following sensible advice is given by Millard's Review of Shanghai, China:

Don't give your agent in China (unless you know him to be reliable) an appropriation for advertising your product in China, without investigating as to how the money is to be spent. It may be used for other purposes, such as the purchase of an automobile by the manager, or the payment of his rent. Select your advertising mediums in China just as carefully as you do at home.

Don't send the office boy or an unpopular salesman you want to get away from the home office to represent your firm in China, for the Chinese business men he happens to come in contact with may be graduates of American or European universities with "Ph.D." degrees.

Don't establish a branch office for your firm in China and expect to amass a fortune in three months. Firms that have been successful in China are those who have studied the field and worked just as carefully and painstakingly as they did when the business was started at home. You can't transplant an American business and expect it to blossom overnight on the soil of China. It must acclimate itself.

WOULD YOU EMPLOY YOURSELF AS A SALESMAN?

(Would you receive a mark of 10 or 20 if you were interviewing yourself as a prospective employe? The following employment blanks in use by the Equitable Life Assurance Society are perhaps the most comprehensive of their kind and are of interest to the employer who has the problem of selecting his workers, as well as to the man who is checking up his own qualifications.—The Editor.)

The following questions make up the employment blanks used by the Equitable Life Assurance Company in employing insurance agents.

Check up on yourself and see if you would qualify—the characteristics called for are essential to success in any salesman's position:

Prospective Agent's History Blank

1. Age——Date of birth——Place of birth——.
2. Nationality——Languages spoken (besides English)——.
3. Residence——Length of time at present residence——.
4. Present occupation——.
5. Education: Indicate by check whether graduate of college—, high school—, or grammar school—.
   Give name of last institution attended——.
6. Family: Indicate by check whether single—, married—, widower—, or divorced—. Dependents—how many?—
7. Social activities: Indicate clubs, lodges, military, church or other organizations with which at present connected. (If officer, so state)——.
8. Health: Indicate by check whether good—, fair—, or poor—. Any physical infirmity?——. Amount of time lost through illness within past two years——.
9. Personal life insurance carried. Old line: $——Lodge or fraternal: $——.
10. Previous business experience (other than life insurance) for past five years:
    Name of Concern and nature of business——.
    Capacity employed——.
    When employed: from——to——.
    Immediate Superior——.
    Reason for change——.
11. Previous life insurance experience:
    Name of company——.
    When employed: from——to——.
    Where located——.
    Immediate Superior——.
    Paid business: Personal——, Through Agents——.
    Reason for change——.
12. Contract proposed is for (whole)— (part)— time. Field in which it is desired to operate——.
13. Finances: Indicate by check whether indebted to anyone. Yes—No—. (If so, to whom and amount——.)
    Indicate by check whether living at home—— or boarding——. If former, is home personally owned——or rented——.
    Indicate by check kind of property owned: personal—— or real estate——. Approximate value——.
    Indicate approximately the monthly remuneration last received, $——, and whether salary——or commissions——.
14. Corporate bond (can—) (cannot—) be furnished. (If one furnished in past, give name of surety company.)
    Remarks: The prospective agent should state here, in at least fifty words, why he thinks he will succeed as a salesman for this society.

Dated———191—. (Signature of Prospective Agent.)

Note.—A photograph (a kodak will suffice) showing date taken, should accompany this blank; to be returned if desired.

Interviewer's Blank

Interviewer..... Agency.....
Date of interview.....Duration of interview.....
Where held.....

Directions: The use of this blank contemplates that a Prospective Agent will be compared under each heading, with 5 other agents who have been previously graded as a standard by the Interviewer as per the "Interviewer's Scale" and the relative standing of the Prospective Agent indicated. For example, if under "Appearance" he compares most favorably with the agent rated as Highest, the Prospective Agent should be credited with 10. Likewise, if under "Address" he more resembles the agent rated as "Average" he should be credited with 6, etc.

The Prospective Agent is rated by the Interviewer as follows:

I.—Appearance. (Grade 10-8-6-4 or 2) .....
Consider how he will impress clients by his facial expression, his physique, his carriage, his clothing, neatness and cleanliness.

II.—Address. (Grade 10-8-6-4 or 2) .....
Consider voice, manner of speech (whether convincing or persuasive), ability to express himself clearly and briefly, quiet self-confidence, courtesy, tact, enthusiasm, cheerfulness.

III.—Character. (Grade 10-8-6-4 or 2) .....
Consider integrity, truthfulness, personal habits, economy, loyalty.

IV.—Industry. (Grade 10-8-6-4 or 2) .....
Consider ambition, initiative, perseverance, systematic effort.

V.—Mentality. (Grade 10-8-6-4 or 2) .....
Consider natural intelligence, versatility, general education, present insurance knowledge or aptitude to master same.

V.—Value to Society. (Grade 40-32-24-16-8) .....
Consider probable value to the Society, giving due weight to all factors, including impression conveyed by "History" blank.

VII.—Reports from Others. (Grade 10-5 or 0)..... .....
If reports are expected but not received they should be rated as "uncertain" and indicated as 5.

Total .....
Allotment: Agent, if appointed, should be alloted for first year $..... Second Interviewer .....
Third Interviewer .....
Grand Total .....
Average .....

The Prospective Agent (is) (is not) recommended for appointment.

.....

Interviewer's Scale

Directions: This blank is for use in preparing a standard by which to judge relatively of the value of Prospective Agents, and one is to be filled out by each Interviewer as his standard. Under each heading disregard every factor except what is indicated by the term. Then select that agent who, for example, you rate as Highest for "Appearance," indicate him by name under Highest—10, and in like manner indicate the agents that you would rate for "Appearance" as High, Average, Low and Lowest. In the same way classify and rate 5 agents under each heading; the same agents may appear under the different headings but will rarely be graded the same. That is, Smith may be rated as Highest under "Appearance" but as Average or Low under "Industry."

I. Appearance.
Consider facial expression, physique, carriage, clothing, neatness and cleanliness.
Highest 10 ..... High 8 ..... Average 6 ..... Low 4 ..... Lowest 2 .....

II. Address.
Consider voice, manner of speech (whether convincing or persuasive), ability to express himself clearly and briefly, quiet self-confidence, courtesy, tact, enthusiasm, cheerfulness.
Highest 10 ..... High 8 ..... Average 6 ..... Low 4 ..... Lowest 2 .....

III. Character.
Consider integrity, truthfulness, personal habits, economy, loyalty.
Highest 10 ..... High 8 ..... Average 6 ..... Low 4 ..... Lowest 2 .....

IV. Industry.
Consider ambition, initiative, perseverance, systematic effort.
Highest 10 ..... High 8 ..... Average 6 ..... Low 4 ..... Lowest 2 .....

V. Mentality.
Consider natural intelligence, versatility, general education, present insurance knowledge or aptitude to master same.
Highest 10 ..... High 8 ..... Average 6 ..... Low 4 ..... Lowest 2 .....

VI. Value to Society.
Consider probable value to the Society, giving due weight to all factors, including impression conveyed by "History" blank.
Highest 40 ..... High 32 ..... Average 24 ..... Low 16 ..... Lowest 2 .....

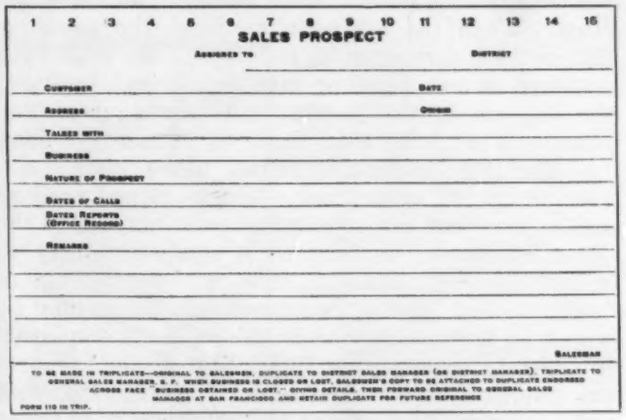
VII. Reports from Others.
If reports are expected but not received they should be rated as "uncertain."
Favorable 10 Uncertain 5 Unfavorable 0

Date.....

HANDLING THE CUSTOMER

(How do you follow up your sales prospect — have you any idea of how much a customer is worth to you—what do you do when you lose a sale? Here are some of the forms and methods in the handling of customers as used by a prominent jobbing concern which are of special interest to all in the selling end of the electrical industry.—The Editor.)

The most important factor in any business is the customer. Considering how little he has to say about manufacturing or selling methods and how many transactions in regard to any one commodity are consummated before the product finally appears upon his horizon, the influence of the ultimate consumer is surprisingly great. It is for him the chain is wrought between the manufacturer, the jobber and the retailer—and concerns which never see him face to face are nevertheless organized to meet his wishes and modified to cater to the change in his whim.



SALES PROSPECT

Assigned to ____ District ____

Customer ____ Date ____

Address ____ Origin ____

Talked with ____

Business ____

Nature of Prospect ____

Dates of Calls ____

Dates Reports (Office Records) ____

Remarks ____

Salesman ____

TO BE MADE IN TRIPLICATE—ORIGINAL TO SALESMEN, DUPLICATE TO DISTRICT SALES MANAGER (OR DISTRICT MANAGER), TRIPLICATE TO GENERAL SALES MANAGER, S. F. WHEN BUSINESS IS CLOSED OR LOST, SALESMEN'S COPY TO BE ATTACHED TO DUPLICATE ENDORSED ACROSS FACE "BUSINESS OBTAINED OR LOST." GIVING DETAILS. THEN FORWARD ORIGINAL TO GENERAL SALES MANAGER AT SAN FRANCISCO AND RETAIN DUPLICATE FOR FUTURE REFERENCE

FORM 110 IN TRIP.

A REPORT ON THE SALES PROSPECT

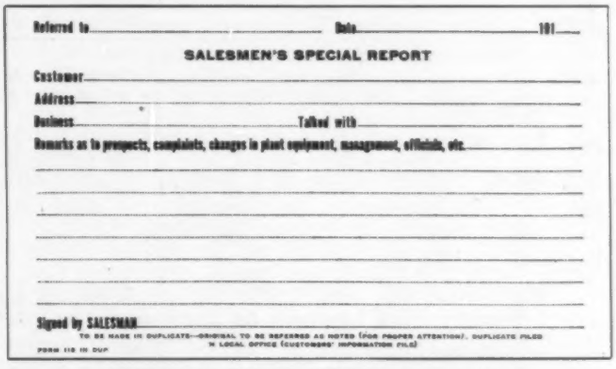
This is made out by the salesman in triplicate, one copy being sent to the general sales manager, one to the district sales manager and one copy kept for his own reference.

In some sense, each branch of the business in its transactions represents the ultimate consumer. Like the House that Jack Built, the jobber purchases from the manufacturer what the dealer will purchase from him, which in turn is controlled by what the general public will purchase from the retail store. Each branch of the industry maintains a selling force to reach its circle of buyers, each acting along the same principles with the same general aim in view—and in each case this selling end is distinctly the most important department of the business. For in any line of work, it is better to sell even a little—and **sell** it, than to manufacture or handle much and have it left upon your hands.

It is perhaps not the habit of the ordinary contractor-dealer to regard himself in the light of a customer—he is rather the merchant who deals with customers. But from the standpoint of the jobber, the link just preceding him in the chain, he represents the ultimate consumer and must be supplied by a selling force and a selling system in underlying principles similar to the contractor-dealer's own.

In working out this department of their business, the Pacific States Electric Company has found various checks upon transactions with customers to be of value.

In the first place each customer has a separate card and a file in which record is kept of his orders, of salesmen's calls, of telephone conversations and



Referred to ____ Date ____ 191__

SALESMEN'S SPECIAL REPORT

Customer ____

Address ____

Business ____ Talked with ____

Remarks as to prospects, complaints, changes in plant equipment, management, officials, etc. ____

Signed by SALESMAN ____

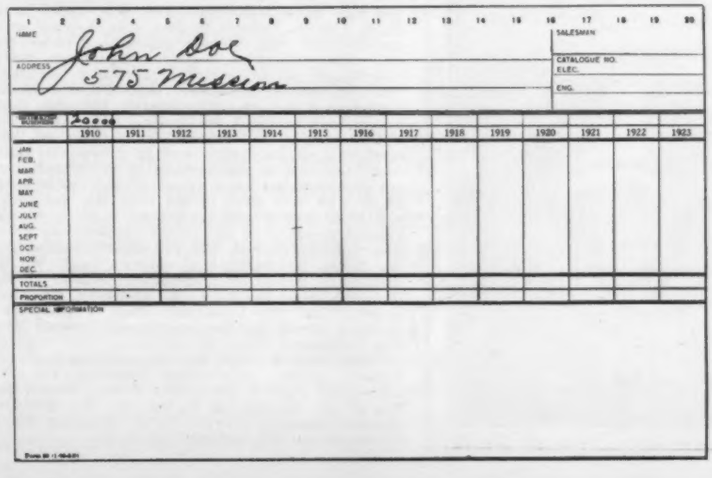
TO BE MADE IN DUPLICATE—ORIGINAL TO BE REFERRED AS NOTED (FOR PROPER ATTENTION), DUPLICATE FILED IN LOCAL OFFICE (CUSTOMERS' INFORMATION FILE)

FORM 110 IN DUP.

KEEPING IN TOUCH WITH THE CUSTOMER

Any information in regard to the customer which should be recorded in the home office, such as complaints, possible visits or changes of personnel are sent in by the salesman on this blank.

the like, so that complete information is at hand as a basis for further business. The card is provided with numbers indicating the various classes of customers — i. e., contractor-dealer, industrial, central



NAME John Doe

ADDRESS 575 Mission

SALESMAN

CATALOGUE NO.

ELEC.

ENG.

	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923
JAN.														
FEB.														
MAR.														
APR.														
MAY														
JUNE														
JULY														
AUG.														
SEPT.														
OCT.														
NOV.														
DEC.														
TOTALS														
PROPORTION														

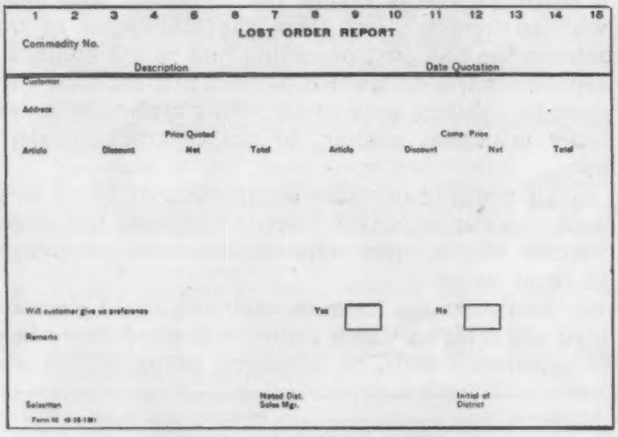
SPECIAL INFORMATION

THE CUSTOMER'S CARD

Each customer has a card on which is recorded his business for successive years. An estimate of his probable orders as judged by the salesman is placed at the head of the column and then the actual amount of monthly business below. This not only serves as a record of the relations between the customer and the company but is the basis for sales campaigns and serves as a check on the work of the salesman.

station and the like — and by a simple system of cutting the card, it is possible to pick out all of a given type from the drawer at once. A colored rider system to indicate the salesmen is further employed. On this card is entered the estimated business with the customer in question, a figure based upon the past year's sales and an estimate by the salesman—and a report of the purchases made each month with the total and a proportional check on the estimate. Space is left for special information.

Lamp sales are specially cared for on maps of the various territories covered in the western states.



WHY WAS THE ORDER LOST?

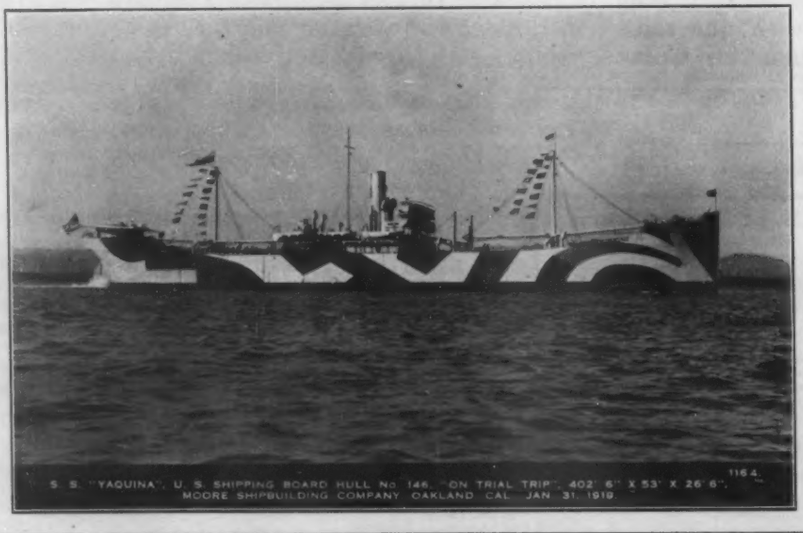
A record of lost sales is the best thermometer of the condition of a business. Note the method of filing by clipping all but the desired number at the top of the card.

Colored pins are used to indicate salesmen, the amount of business done in a community, the number of calls necessary and the like, so that it is possible to tell at a glance just what business is being done and where.

The cards and charts are used to draw up the detailed analysis of business at the end of the year. By picking out the cards of various types in a given district it is possible to figure out for every community just what amount of business is carried on there, of what types, what the record has been for past years and consequently, what will be the probable business for the coming year. Salesmen's routes and the number of their calls are determined by these figures.

Various forms are used for the convenience of salesmen. Reports of conversations which should be recorded, complaints, information of contemplated visits to headquarters on the part of customers and other such occasional information are recorded on a special form called "Salesmen's Special Report" which is made out in duplicate and forwarded to the local office. Here one copy is placed in the customer's file and the other forwarded to that department particularly concerned with the case in question. A "Sales Prospect" form is filled out and sent in for every new customer talked with. This is made out in triplicate, the original being kept by the salesman himself, one copy sent to the district manager and the other to the general sales manager at San Francisco. When the business is closed, the salesman fills in the information as to whether the order was obtained or lost together with details and forwards the original to the general sales manager at San Francisco, retaining a duplicate for future reference.

The most important report to be made, however, is that of orders lost. Orders gained need no explanation, but within a lost account may lie all the secret of success or failure. A competitor may be underbidding, a salesman may not be capable of "selling" that type of customer, something may be wrong in the line carried or the methods employed. In order to check up on this, "Lost Order" reports are required of all salesmen. The accompanying form indicates the nature of the report. It is, of course, difficult to obtain frank information on this point, as all salesmen are inclined to look upon their failures as personal—but the value of his reports in this regard is part of the test of the value of the salesman. This data is made out in duplicate as are the others, one slip being posted in the customer's file, the card in a special "lost orders" file where it is available for special consideration.


S. S. "YAQUINA", U. S. SHIPPING BOARD HULL NO. 146, ON TRIAL TRIP, 402' 6" X 53' X 26' 6".
MOORE SHIPBUILDING COMPANY OAKLAND CAL. JAN 31, 1919.
1164.

AN UNUSUAL SHIP

The S. S. Yaquina, built by the Moore Shipbuilding Company of Oakland, California, for the U. S. Shipping Board, underwent its trial trip on Jan. 31, 1919. While several of the electrical features, notably the pilot lights for steering, present new and interesting features, this splendid new ship which measures 402 ft. 6 in. by 53 ft. by 26 ft. 6 in. is unusual in that it is designed as a conveyor of cold storage products. There are only three others of similar specifications being undertaken in the entire shipbuilding program. The cold storage equipment, which has been installed at a cost of approximately $500,000, is of a very high grade of excellency. It is interesting and instructive to examine the manner of heat insulating all hatchways and to follow the great detail involved in maintaining uniform cold storage temperatures in a vessel of this magnitude. Those who took part in the trial trip festivities and their guests are as follows: A. J. Moore, general manager of the Moore Shipbuilding Company; J. S. Barnes, general superintendent for the Moore Shipbuilding Company; Capt. W. H. Allison, in charge of performance branch of the U. S. Shipping Board; F. A. Anderson, electrical inspector for the Emergency Fleet Corporation; M. Ryan, steam turbine department, General Electric Company; Capt. Y. Kittleson, new captain for the Yaquina when put in commission; E. C. Webber, steam engineering inspector for the Emergency Fleet Corporation; Robert Sibley, editor of the Journal of Electricity; Mr. Stewart, resident inspector for the U. S. Shipping Board at the Moore Shipbuilding Company.

SELLING YOUR SALES LETTER

BY H. A. LEMMON

(Selling by mail is no different process from selling through a personal interview — and the same understanding of human nature must go into your letters as you put into your conversation. This is the first of a series of articles on the problems of the salesman which are to be written for the Journal of Electricity by the well known sales manager of the Truckee General Electric Company.—The Editor.)

Sooner or later the Contractor-Dealer will write a letter to be reproduced by the hundred and mailed to the anxiously awaiting citizens in his field. Of course these letters are issued with the fond hope that they will pull in new business and increase the old. As the old song about the girl runs "some do and some don't," but mostly they don't, and yet there is no real reason why any man who owns an electric appliance shop should not add materially to his profits with business whipped up by mail. Probably however, not one letter in ten actually brings returns that profit anybody save Mr. Burleson's department and the printer.

A baldheaded barber is not a good advertisement for hair tonic, nor are you likely to be believed if you advertise your prosperity on cheap stationery. The outward appearance of that silent salesman, your letter, is as important as your own clean collar and clean hands in waiting on a customer or in making a salesman's call.

A sales letter is another one of those things apparently so extremely simple that it doesn't seem to amount to much and our inclination is grope about all over the place looking for ideas and smart and unusual phrases when as a matter of fact that which we are seeking is just what we must avoid.

The First Impression —

If however our Dealer is unable to make progress perhaps we can help him to at least get started by laying down a rule, as follows:

Let him make a collection of the letters from manufacturers and others which urge him to buy goods. He should read these over carefully and from nine of every ten of them he will gain valuable knowledge of what not to do.

If after mature consideration he is still determined to write a letter about his goods or his shop, let him also determine that he will dress up his communication in a manner worthy the gem it is to be. And a good deal depends on the paper upon which it is printed and the envelope in which it is enclosed. Testy dyspeptics will still whine that too much attention is given to appearance and not enough to real worth, but the fact remains that a baldheaded salesman must possess unusual skill to successfully sell hair restorer, and it is almost equally difficult to convince your customer by mail that yours is a high grade business if you approach him on the thin pink sheet of his pill manufacturer. Painful as it is, the fact remains that occasionally we must trust some one and in this case it may as well be the printer. Tell him you want a letter printed on good quality of bond paper—not lighter than 20-lb. and preferably 24-lb. or even heavier, with envelopes to match both in quality and weight. An extra heavy sheet of bond paper carries with it those confidence-inspiring qualities which a clean shave and haircut give the personal salesman. The best color paper is white; although of course every so often adventurers into the threadbare real of experience will desire to experiment with tints. If our dealer is one of these let him select a tint—he might as well get it out of his system and have it over with in order that his idiosyncrasy may not mar future efforts.

How to Begin —

It perhaps is an undue display of confidence to select the paper before we write the letter, but we will get to that at once. First of all, we must remember that this is to be a business letter and not a scenario for a vaudeville turn; that is, we do not want anything cute, cunning or humorous in it. To ask a woman to pay $52 for a suction cleaner when her sister purchased the same thing for $29 before the war is not considered very much of a joke in the best circles.

Without straining our intellects to the point where a headache will result, we probably can agree that it will not matter so much how good a proposition we may offer in our letter if the woman who receives it merely glances at it and throws it aside. And yet as soon as she heard the postman's whistle she dropped her sewing and rushed out to get the mail—not that she expected anything specially but because she is of a hopeful disposition and thinks something interesting might arrive some day. So we know that she really wants to read our letter if we will only frame it so she can, and if it is interesting she will do so even to the extent of allowing the biscuits to burn. We may be justified in the conclusion that the opening sentences must compel her attention. Even then, however, she may read a sentence or two and unfeelingly fracture our hopes by chucking our effort into the garbage pan. Therefore we must not only gain her interest but must keep it. We may pardon her if, having given us her attention, she is curious to know what we are going to do with it—and that of course is disclosed in our "proposition," without which we may as well have saved the printer's bill. And thus by comparatively painless stages we come to the "close," which is by no manner of means the least important of the

whole. If we all can agree up to this point we will assert that any sales letter to be successful must contain at least three elements: an interest-compelling "opening," a "proposition" and a "close."

Putting in Personality —

The fellows who write letters telling us how to write letters always say, "Put personality and individuality in your efforts." Sure, but whose personality and individuality? Why, that of the man who is supposed to be writing the letter, of course! Simple, isn't it? And yet that apparently trite statement about personality and individuality which has been accepted without question throughout the ages has ruined more otherwise promising letters than any one thing, because it is absolutely wrong. The

"We are happy to tell you that we have in stock—." Such a beginning is likely to bring the letter to an untimely end — in the waste basket. The housewife is a person with troubles of her own and she doesn't care whether you are happy or not. It is only by touching her needs and problems that you will get your letter read.

good letter breathes not a single bit of the personality or individuality of the writer, but is full of that of the person who receives it. You see, you write in the other fellow's personality—not your own.

If you are careful in your violations of the moral code the community in which you reside doesn't care very much about you and to the recipient of your letter you are merely one of several hundred—or thousand—other units of the community, so when you talk about yourself you are discussing a very uninteresting subject and I, your listener, yawn politely behind my hand and right in the middle of your dissertation upon your merits break in by wondering if the price of meat is ever going to come down again, and privately I consider you very much of a bore; but if on the other hand your conversation has me as the central motive, I immediately marvel that I have not fully appreciated your wisdom and judgment heretofore.

A Household Fable —

The other Saturday night I was out rather late with a bunch of other statesmen who felt it best, once we were together, to settle a number of international problems which have been annoying the President and the Senate. We were full of enthusiasm and ardor, the room was comfortable and the waiters attentive. My watch had stopped and it wasn't until the police closed the place around 3 in the morning that I happened to remember that I had forgotten to go home. As I approached my domicile things appeared propitious; windows all dark, and no reason in the world why I shouldn't get in quietly, and even in the dark I should be able to find my way to the bureau, and set back the clock thereon three or four hours before the light flashed up. I padded in on the lawn and was getting along nicely when I struck a bit of ice on the steps and came down with a crash that brought lights into the windows of all the neighbors' houses for a block each way. My wife came rushing out, solicitous and excited, and in a voice which caused doors to open in those homes where lights only had appeared before wanted to know if I were killed. In a perfectly calm, dignified manner I assured her that I was not only not killed but wasn't even injured, and if I could escape the severe frost would probably survive the winter. Instead of being overjoyed, as I of course expected, the lady of my house appeared somewhat disappointed and expressed it at length and with reiteration. I seemed to have forgotten the clock, but she hadn't. A couple of hours later our Airedale pup, who by strange coincidence also had had business out that night, came home and howled and scratched our new front door until the lady got up and let him in, I of course feigning sound slumber. One of the neighbors came over at an unreasonable hour to learn what all the commotion was about; also it appeared that I had neglected to remove my rubbers and it seems that muddy rubbers leave tracks on a carpet. There are a lot of things in domestic affairs which are of no concern to the public. Suffice it to say that things went as well as could be expected until my wife opened a letter which had come for her, and then she started talking to herself. After a not too brief recital of the events of the night before she said:

"Here I've been hard at work for four hours before any of the rest of the family are about. I've washed dishes and cooked breakfast, and baked bread and swept and dusted, and then I get a letter from Spinks & Duffie starting off, 'We are happy to announce that we have just received a new stock of,' etc. What in the world do I care to know how happy Spinks & Duffie are or what makes them happy? Happy,—why, I don't suppose I will ever know what the word means again," and she tore up the communication viciously. "And I don't care whether they have a new stock of goods, either, nor whether their store cat has kittens, or anything else about them," and her emotions overcoming her, she arose from the table and left the room.

On Beginning —

And inadvertently the lady told us what to do and what not to do regarding that first paragraph. First, we are not to talk of Ourselves, and in applying the second discovery we would start something like this:

Dear Mrs. Jones:

After you have washed the breakfast dishes, and made up the beds, and have placed the roast in the oven and scoured the kitchen sink, and have wiped off the pantry shelves and run up and down the cellar steps a half-dozen times, you are ready to begin the most disagreeable work of the day—sweeping those heavy carpets and dusting the furniture afterward, etc., etc.

And some variation of the above, in accordance with

the domestic or business problems of the woman or man you propose to appeal to, will apparently answer the requirement of arresting attention and also of injecting personality and individuality into your letter.

If your mail contains a letter which recites a number of the irritating and tiresome incidents of that very morning your attention is won immediately and the writer has gained your sympathetic interest in whatever he may propose. He has written **your** personality into it. We are always convinced of the infinite wisdom of the man who tells us something we already know. We do not stop to think that what he has told us and what has happened to us that day also happened to every other business man in our particular line.

In the above instance it is obvious that a suction cleaner is the "proposition" and in a paragraph devoted to it we will say less about the cleaner itself than to show how the drudgery of the broom and the dust-cloth may be readily transformed into a pleasant, quickly performed incident.

One thing about this type of opening paragraph to which we must accord due importance is that it tends to create dissatisfaction with present conditions in the minds of those who receive it and dissatisfaction is the great buying motive always.

The Meat of the Matter —

Having created the desire of ownership, we now come to the real test: Will he be able to whip her brain into action; in other words, to rearrange her financial affairs so she may spare the money, or as a preliminary to make the physical effort necessary to come down to our shop and witness a demonstration—to have the handle of the suction cleaner placed in her hands? And yet if we did not succeed in that we have failed the purpose of our letter.

There are several ways in which this may be accomplished. One is to offer a cash discount, or a special price for a certain very limited time, thus urging that quick action will be necessary to avail herself of your offer; still another is by giving a premium; or you may offer special installment terms. These should be avoided if possible. The best climax—but unfortunately the one requiring the most skill—is to emphasize the inconvenience and drudgery which must continue to be endured until the woman shall enter into possession of one of our cleaners and to convincingly assert that this delay is a useless sacrifice of energy.

If we are selling Mazda lamps in a community wherein many carbon lamps are still in use perhaps we will start our letter thus:

"We have a fine stock of Mazda lamps on hand which we are offering our customers. These lamps will give twice the amount of light for the same money as your old ones."

I say perhaps we will begin in that manner; but let us hope instead that we will start something like this:

"I can save you from $2 to $4 per month on your electric light bill."

More people are interested in a definite money saving than they are in the æsthetic side of home illumination.

Ideas from the Northwest

(Some of the ideas in store arrangement and selling kinks which contractor-dealers in the Northwest have worked out. Here are suggestions from Salem, Ore., Spokane, Wash., and Vancouver, B. C.—The Editor.)

A SPECIAL FIXTURE DEPARTMENT is a feature of the store plan of the Salem Electric Company of Salem, Oregon. Fixtures are one of the hardest types of material to handle effectively in store arrangement, particularly because they do not mix well in a display with electric irons or electric washing machines and like appliances. To avoid this difficulty they are usually placed in a dark corner at the back of the store where they may be displayed to persons inquiring. This, of course, has its objections, for the strong advertising value of attractive fixtures is not taken advantage of—and the possibilities of an effective night time display visible from the street must be given up. The store of the Salem Electric Company has the distinct advantage of a corner location which permits the segregation of the fixtures into one department and at the same time, the proper and attractive display of the goods. The rear of the store is partitioned off and made into a fixture room which, however, has a window of its own, always attractively decorated with its own wares. The view shown is a night time picture of this display which shows how readily visible the interior is from the street.

The fixture room has a window of its own which gives effective display to one or two special lamps and offers a vista of the attractive stock within.

RENTING LEADS TO SELLING in many cases — in electrical appliances as well as in real estate. The application of this principle was what has led one Oregon dealer to rent vacuum cleaners at the nominal charge of seventy-five cents a day. He does this for but two months of each year—March and April. May first he announces the end of the rental period and recalls all cleaners that are out. He states that it is surprising how many sales are made to people who do not want to give cleaners up after having once used them. If the purchaser desires, time payments are accepted and many cleaners are sold in this way.

THE STORE WITH THE MOTTO — is the way the citizens of Spokane have come to think of the Alexander Electric Company of that city. "W E H U S T L E" in galloping letters has come to mean this store. The sign is in the front of

A novelty which is very popular with the children of customers—and even with the grown ups and which brings the idea of the motto home. By pushing the little interior card in and out of the envelope under a celluloid window pane, the letters are ingeniously made to "gallop."

each of their show windows, and is operated by means of a main shaft and eccentrics. A small motor furnishes the power necessary to keep the letters dancing for twenty-four hours a day. The result is that every person coming within visible range of this window carries away a definite association of the sign with electrical service and an eagerness to give the best service possible.

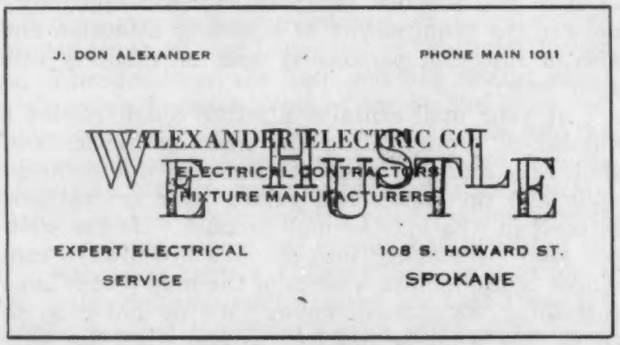
That the value of advertising is enhanced by repetition is a belief of Mr. Alexander, as is shown

The motto is most prominent in the windows of the store where the letters are operated by means of a main shaft and eccentrics. This motto is used on bill heads and on the shop bicycle. In order to keep it before the eyes of customers, it is made part of a nameplate which is attached to all apparatus and equipment leaving the shop.

by the numerous ways in which his sign is placed before the public. The familiar letters appear

On memo books and optical delusion toys distributed to customers.
Outline letters on company stationery.
Outline letters on business cards.
Bill heads.

Name plates on all apparatus and equipment leaving the shop.
Sign incorporated on check protector.
Even the shop bicycle has its sign attached.



The letters are stamped in blue outline on cards and stationery and are incorporated in the check protector

The boys of the vicinity are energetic boosters through the medium of small memorandum books distributed to those coming to the store after them. The little optical illusion dodgers, with their dancing letters, are also favorites with the boys.

The hustling sign has proven such a valuable feature to this up-to-date electrical store that steps have been taken to have it registered and protected.

THE HUMAN INTEREST is supplied in this window of the Electric Supply and Contracting Company, Ltd., of Vancouver, B. C., by a wax lady who sits in a chair with a brightly colored cushion loaned by a furniture store. The display is one of reading lamps, of course—and there is just the touch of humor in the card which reads "This Lady's Eyes

A wax lady is here effectively advertising a reading lamp. The chair with its bright colored cushions is loaned by a furniture store which is glad of the additional advertisement. The bubbles above the lady's head are not dreams, but the reflection of the street lamp.

Will Never Get Tired" to relieve the idea of any stiffness. The window as a whole is very simple and very attractive with several excellent features. One idea is presented and driven home. Signs are effectively used to tell the story—the sort of signs which will be read and remembered. The background in similation of a home interior is not overdone by any attempt to attract attention to itself and yet charmingly suggests the desired effect. The opportunity of cooperation with dealers in other lines such as plumbing or furniture, by borrowing and lending properties, opens up an opportunity for a pleasant variety of backgrounds and most effective window displays.

EXAMINATION FOR SUPERVISING ELECTRICIAN

(Questions and problems of the Supervising Electrician's examination held during February in Portland. This examination is required of all contractors or others who supervise electrical work in the city of Portland. Try them and see how you come out.—The Editor.)

Practical Questions

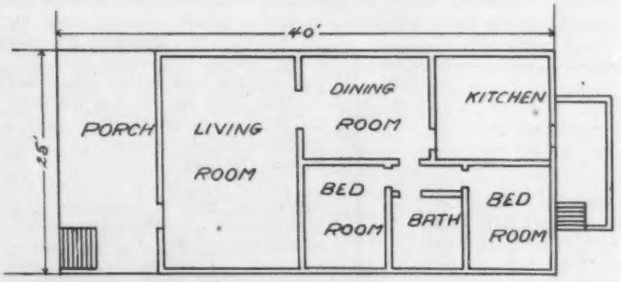
which counts twenty-two points.

1. (a) Bend a "goose neck" in conduit according to sample.
   (b) Bend an offset in conduit according to sample.
2. (a) Connect up heater switch.
   (b) Wire in a set of three and four-way switches.
3. (A) Wire up a shunt wound motor to a rheostat.
   (B) Reverse the rotation of the motor.
4. Hang a combination gas and electric fixture.
5. Solder lugs on strander wire.

Questions on the City of Portland's Electrical Code

Note: Each question counts two points, except Question 10, which counts twenty-two points.

1. How must the conductors from a generator to a switchboard be run to conform to the Code?
2. What protection must be provided to properly protect constant potential generators?
3. Do bus bars have to be always insulated? On what basis per square inch of cross section must they be figured to conform to the Code?
4. State whether or not lighting arresters are required by the Code on residence service wires?



I—Mark Portland Electric Code symbols as follows:
Porch—2 center lights on flush switch.
Living room—1-4 light fixtures and electrolier switch.
Bed room—1 cord drop, 1 snap switch (each).
Dining room—1-3 light fixtures, 1 flush switch.
Bath—1-2 brackets.
Kitchen—1-2 gas and electric fixtures, 1 snap switch.
Kitchen—1 iron plug on wall.
Living room—2 floor plugs.
Dining room—2 base plugs.
Kitchen—1 electric range outlet.
II—Mark on plans allowable wattage for each outlet.
III—Give list of material and approximate quantities, needed to completely wire the above job.

5. State the maximum percentages of the full load current of a 3-phase induction motor that may be used for "starting" and "running" fuses,
6. By what must each motor and its starting device be protected and controlled to conform to the Code?
7. State whether or not the neutral wire of the direct current three-wire system must be grounded?
8. Name and describe three kinds of insulation on wire that is most commonly met with in everyday wiring practice?
9. Does the Code allow Oil Transformers to be placed inside of ordinary store buildings?
10. Blue print.

Problems

Note: Each question counts three points, except Question No. 5, which counts eight points.

1. Calculate the size of wires to be used for the following motors:
   One 10 h.p. 220 volt, 85 per cent efficiency, direct current.
   One 5 h.p. 110 volt, 80 per cent efficiency, 3-phase, 60 cycle induction motor.
2. In a three wire, direct current system, with thirty ½ ampere incandescent lamps between the neutral and the positive side, and sixty ½ ampere incandescent lamps between the neutral and the negative side, how many amperes will be flowing in the neutral when all the lamps are burning?
3. How many 10-watts, 11 volts lamps in a sign using 909 amperes?
4. What size of rubber covered wire in conduit should be used to conform to the requirements of the city Code with an allowable drop to the farthest lamp of 2 volts,—the load consists of 42 incandescent lamps, which take 1 ampere each, distance 90 feet on a single phase, two-wire system?
5. Given ten circuits of 10-40 watt lamps (each),
   " " " 20 amperes for electrical heaters (each), 110v.,
   2—5 h.p., 230 volt d.c. motors.
   All to be connected to a three wire, direct current system, with individual circuits to be run from one center of distribution. Specify the following:
   (A) Minimum capacity of main service feeders in amperes.
   (B) Minimum capacity of sub-feeders in amperes, for each circuit of lights.
   (C) Minimum capacity in amperes for sub-feeders for heaters.
   (D) Minimum capacity in amperes for sub-feeders for each circuit of motors.
   (E) Draw a diagram showing the best and the most economical arrangement of main service feeders and each sub-feeder for the individual devices and motors specified, marking the proper size of rubber covered wire B. & S. gauge on the diagram.

FOURTEEN RULES FOR ELECTRICAL CONTRACTING PRACTICE

The following Code of Practice is recommended to architects, consulting engineers, contractors and owners as well as owners' engineers, by the National Association of Electrical Contractors and Dealers, the Executive Committee of which adopted and approved it as a step toward the standardization of many practices in connection with the original contracts and those for extras which, unless definitely settled in advance, leads to misunderstanding on both sides and frequently to controversies and litigation. The National Association does not, however, attempt to bind its members to use this code, but respectfully submits same for the approval of both customers and contractors.

Rule X. Changes in or additions to contract plans or specifications shall be made the subject of estimate or shall be based on the time and materials involved.

ORDER AND SYSTEM IN YOUR BUSINESS

(The Journal of Electricity announces that a series of articles on The Business Library, written by Louise B. Krause, librarian of H. M. Byllesby & Company, Chicago, Ill., will begin in the issue of April first. Miss Krause has recently completed a four weeks' lecture period on the subject at the Riverside Library Service School, Riverside, California, based on her observations and experiences as a business librarian during the past ten years.—The Editor.)

Does your desk ever become crowded? What do you do with your important catalogs and statistical data? How about photos—and especially your maps and blue prints? Do they await your service in orderly, easily accessible arrangement or do all these things picture to you a household of despair? The Journal of Electricity has appealed to the best talent in the United States to assist in giving to our readers just what is needed on this subject. Think of the great Byllesby Company, what it today means for order, system and efficiency.

Miss Louise Krause, the pioneer and today the head of the new idea for systematic order in business routine, officially known to the Byllesby Company as their business librarian, is to be the author of a series of articles that will sell to you the library idea in business in the same way that the "electrical idea" has been sold to the public as an indispensable factor in modern life. The "library idea" does not include any preconceived picture of dingy shelves, of books you may some day read at your leisure, but it means an idea that when sold to you will teach you order and system in your business routine—an indispensable part of your daily life.

In order to learn the attitude of business men and libraries as to the need and value of this series, letters were written to leaders in the work throughout the country asking advice and criticism. How vital this subject is to business men may be judged from some of the replies received from big concerns which have established libraries of their own and from the public libraries themselves.

George B. Utley, Executive Secretary of the American Library Association, writes:

I am glad to know that you are to issue in your Journal the series of articles by Louise B. Krause on "The Business Library," which she has delivered recently at the library school of the Riverside Public Library. Miss Krause is a woman of library training and experience, has been for several years librarian of the H. M. Byllesby Company, of Chicago, and is thoroughly acquainted with the subject of which she treats. In looking about for the most suitable person to deliver this series of lectures, Joseph F. Daniels, the librarian of Riverside, very logically selected Miss Krause as one of the country's leading exponents of the practical value of a professional library to a business house, and the distance of Chicago from Riverside did not deter him from obtaining her services.

Ten years ago it was something of an innovation for a business house to install a library and employ a trained expert librarian. Now it is considered quite the proper thing. Then it would have been counted a luxury; now it is regarded a necessity. A business library is to its house a bureau of information to which the officers and employees turn for facts, whether they concern a matter of policy wanted by the president, or the best way to ship goods to Timbuctoo, wanted by the shipping clerk.

But notwithstanding its proved worth, some business houses are not yet availing themselves of the service of a library; in some cases due to ignorance of what library service means; in other cases because they think they can not afford it. Miss Krause will, I think, show what a library is worth in dollars and cents, and her articles will, I hope, be read by some who have never given the subject the attention that for their own interest and profit it deserves.

Furthermore, some business men are woefully slow in getting out of their public library all the service to which they are entitled. Some business houses are too small to afford a full-fledged business library, but no business man can afford not to use his public library,—if he doesn't he is paying for something he is not getting any benefit from. Every public library that is worth what the public is paying for it, makes particular effort to acquaint business men how it can help them in their business, and if a public library does not have what the average business man needs, not only in books, periodicals and other ephemeral matter, but in service as well, it is the duty of the public-spirited business man to investigate the reason why.

Miss Krause's articles will doubtless tell a business man how he can get the best use out of his public library, as well as out of a specialized private library, and I sincerely hope this series will reach a wide circle of business and professional men.

GEORGE B. UTLEY,
Sec'y American Library Ass'n.

Edward D. Tweedell, Assistant Librarian of the John Crerar Library, in Chicago, writes:

I am glad your readers are to have the benefit of the articles on "Business Libraries" by Miss Louise B. Krause. Knowing Miss Krause personally and also having an intimate knowledge of what she is accomplishing in her own business library, I feel sure there is no one better qualified to write such a series.

Business men are beginning to realize more and more that books have something vital to contribute to the success of their undertakings. The experience of others in certain lines may be very helpful, in avoiding mis-

THE BUSINESS LIBRARY

The series of articles on "The Business Library" shortly to appear in the Journal of Electricity will give **helpful suggestions to the business man** who already has established library service within his organization, or who is considering the possible value of inaugurating such service.

It will tell the small business office, in detail, **how to procure, catalog and file information** without the aid of a trained librarian, and will suggest information of value to be found in public libraries, which are invaluable aids both to the individual business man and to organized business libraries.

It will give to public librarians a more intimate knowledge of **the business man's point of view** and his growing demands for quick service and up to date information.

The following topics will be treated in a series of twelve articles:

The organization and purpose of the business library.

Special sources of information for the business man—how to acquire, how to use and how to file them.
- Periodicals
- Government documents
- Trade catalogs
- Photographs
- Lantern slides
- Reference books

The classification, cataloging and filing of business information.

Mechanical equipment and supplies.

The librarian's essential qualifications for success in business library work.

takes, saving expense, and increasing the success of the enterprise.

A business library deals not only with the buying, selling and accounting end, but with the manufacturing, the raw materials, new projects, in fact, furnishes information of value, all the way from the spelling of a word to helpful knowledge in matters of policy and future development.

These articles will show the business man what the library can do for him, and will show the librarian how the results can best be obtained. Miss Krause as a successful pioneer in this line writes with abundant knowledge and authority

E. W. TWEEDELL.

W. H. Cameron, Manager of Industrial Relations of the Eastman Kodak Company, gives us the strictly business point of view:

I have the highest respect for the experience, ability and point of view of Miss Louise B. Krause. I have consulted her freely during the past five years while organizing and promoting the business library of the National Safety Council at Chicago.

In my opinion, Miss Krause is one of our national experts upon the theory and practice of making business libraries effective, and it seems to me that the series of articles referred to in your letter should be of great value to your readers. I know that I would personally be much interested in reading the series myself, and I know that the executives of industries interested in establishing business libraries would be interested in the practical advice Miss Krause would give in the proposed series of articles.

I cannot use superlatives that in my opinion would praise too highly Miss Krause's work and experience in the building and management of business libraries.

W. H. CAMERON,
Manager, Industrial Relations.

Representative of the western attitude is the letter of **Everett R. Perry,** librarian of the Los Angeles Public Library:

Your letter of January 24th relates to a subject to which I have given much consideration. Business libraries have existed in the East for some time, especially in New York and Chicago, and they undoubtedly render a most valuable service to the firms which have established them. On the Pacific Coast we apparently have been a little slow in adopting the idea. There is no question that your main contention is well founded. The business man of most communities has no adequate realization of the aid that he may secure from his public library or from a business library.

I think you are safe in printing any series of articles that Miss Krause writes. Her reputation as a business librarian is very high. She thoroughly understands the scope of business libraries, of the need of which most librarians are now convinced, though with some regret, I fear, that public libraries cannot command sufficiently large funds to enable them to provide the service down to the fine point which should be possible in a good business library.

I thank you for calling the series of articles to my attention, and I shall read them all.

EVERETT R. PERRY.

There is space for only a line here and there, to show the general attitude of other librarians:

"If business men who do not feel that they can establish a technical library of their own would get the library habit, or even the library telephone habit, it would mean dollars and cents to them."

"I have felt that a very large number of business men do not realize what they are missing when they do not use the resources of the library, particularly of a library that makes a special point of collecting and exploiting business literature. If you can find some way of promoting this end, you certainly will render a great service."

"The plan for a series of articles on Library Service for the Business Man is an admirable one and deserving of the best you can get in the way of material and of the utmost publicity in bringing it to the notice of business men."

"If you can get the business man to see the value of the library in relation to him, the library will still further increase its service with the growing demand."

"The libraries are beginning to be known as necessities rather than luxuries. Wide-awake business men realize that they cannot keep abreast of the times without the aid of the library."

SAVING THE WASTE IN THE CHIMNEY—V.

BY ROBERT SIBLEY AND CHAS. H. DELANY

(Correspondence from many quarters has come into the Journal of Electricity relative to the series of articles on "Fuel Oil and Steam Engineering" which in recent months has appeared in book form. The authors herewith publish five of the questions that have been asked as they doubtless may prove of general interest.—The Editor.)

Questions Answered on Fuel Oil Economy

Question 1. What is the approximate increase, if any, in boiler repairs when coal fired boilers are changed to oil?

Answer: The amount of boiler repairs is practically the same when burning oil as when burning coal, provided the boilers are operated at the same capacity and the oil burners are properly adjusted so as not to blow oil direct against the boiler tubes or direct against the brick walls.

Question 2. Is the back shot method the best for Stirling boilers?

Answer: The back shot oil burner is generally considered the best for Stirling boilers, owing to the advantage gained by the large combustion chamber.

Question 3. Can you give the comparative costs, per 1000 pounds of steam, of coal vs. oil, including all boiler room costs? In this question I have in mind modern firing facilities. Give the unit prices for both coal and oil.

Answer: In regard to the comparative costs of oil vs. coal the reader is referred to a diagram by one of the authors that was published in the Journal of the American Society of Mechanical Engineers, Vol. 40, No. 7, Part II, July, 1918, on which the relative value of oil is plotted against coal of various qualities. From this diagram the reader can see at a glance, for instance, that oil costing $1.50 per bbl. is equivalent to coal of 10,000 B.t.u.'s costing $3.50 per short ton or coal of 14,000 B.t.u.'s costing $6.00 per short ton.

Question 4. What quantity of oil have you found by actual tests is necessary to evaporate the same quantity of water as 1 ton (2240 lbs.) of coal, giving B.t.u.'s in coal and oil?

Answer: The quantity of oil necessary to evaporate the same quantity of water as one ton of coal depends entirely on the heating value of the two fuels and the boiler efficiency obtained. If the heating value of coal is 14,000 B.t.u.'s and the boiler efficiency is 72%, each pound of coal would evaporate 10.35 lbs. of water from and at 212°. One pound of oil containing 18,000 B.t.u.'s with a boiler efficiency of 78% would evaporate 14.4 pounds of water from and at 212°. From this you can readily figure out that one ton of coal containing 2240 lbs. would evaporate the same quantity of water as 4.8 bbls. of oil each containing 336 pounds.

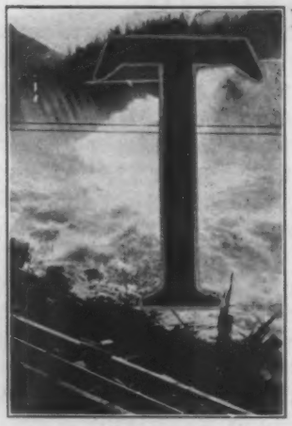
Question 5. Have you found mechanical atomizing to be the most economical?

Answer: Oil is atomized by steam in nearly all stationary boiler plants due to the fact that steam is more convenient than any other method, and the atomization is very perfect. As a rule mechanical atomization is not used unless the loss of fresh water used in steam atomization is an important consideration.

Raw materials, saw mill, factory, reservoir, power plant and shipping facilities are all within a few hundred yards

MAKING PAPER BY ELECTRICITY

(A reservoir, penstock and power plant all within a few hundred yards, and what is more, the factory utilizing the power, the raw materials and the shipping facilities immediately adjacent —are typical of the unique possibilities in the West for the development of power to meet the needs of individual industry. The special requirements of the paper industry for uniform speed further bring the necessity for adjustments of peculiar interest to the power man.—The Editor.



At flood periods, a maximum of 12,000 cu. ft. per sec. is discharged over the spillway.

THE Ocean Mills Plant of the Pacific Mills, Ltd., is an interesting and unique instance of a compact installation peculiarly convenient to meet the needs of the paper industry. The plant is located some 350 miles north of Vancouver in the midst of the Canadian forests. Thus it becomes possible for the factory to be brought close to the source of raw materials and a fortunate fall in the river at this point provides power immediately at hand.

A dam across the stream of 53 ft. in height has formed a lake which varies from 8.45 sq. mi. to 9.18 sq. mi. at high water. A log chute gate is provided 10 ft. 10 in. by 9 ft. 8 in. of wood with metal bearing strips of ⅜ in. iron. Discharge openings are located at the bottom and hand operated, although motor operation can be installed. At flood periods, a maximum of 12,000 cu. ft. per sec. is discharged over the spillway.

The Power Equipment

Two power plants generate the electricity which operates the machinery of the saw mill and paper mill . These are fed by two penstocks of 966 ft. and 549 ft. respctively which deliver the water under a head of 130 ft. Power house No. 1 is a reinforced concrete building provided with 2 Francis turbines and a Pelton water wheel with a combined capacity of 8,850 h.p. There are two 60 cycle, 2200 v. generators of 1850 kva., 225 r.p.m. and one of 3750 kva., 360 r.p.m. direct connected. Power house No. 2 is used as a standby plant with three 600 kw. wicket gate inward flow turbines directly connected to three 60 cycle, 600 kw. generators at 440 volts. The turbines in No. 1 are controlled by Woodward governors and by type P Lombard governors in No. 2. Power house No. 1 delivering 2200 v. and Power house No. 2 delivering 440 v. are tied together with tie lines and transformers.

Motors in Use

There are about 200 motors in use throughout the plant ranging in size from 10 h.p. to 725 h.p. The majority are squirrel-cage induction motors; there are also several round rotor motors, some equipped with brush lifting device, also a number of d.c. motors on cranes, monorails, etc., three being located in the roll grinder where the rolls of the paper machines are re-ground.

The d.c. motor and generator used in connection with the paper machines has a Westinghouse panel board containing the necessary relays and switches. Provision has been made for starting, stopping and changing speeds at a convenient place in the paper-machine room, the sets being located on the floor below.

For driving the paper machine, speed regulation is very essential as any change in speed will vary the weight or thickness of the paper and is very apt to cause a break, which is a very serious interruption in the output of paper.

The Process of Paper Making

The majority of raw material used in making paper today enters the paper mill in the form of mechanical or chemical fibre, which is produced from timber entering the mill as logs or cordwood. If the

A log chute carries down the logs which are imprisoned by the dam. This is closed by a gate the top of which is just visible in the picture.

cordwood is not previously barked in the woods it is run through barkers, after first being sawed and split into suitable sizes for handling. These barkers remove all bark and leave the wood in shape for the first step in the manufacture of paper.

Passing from the barkers the wood is conveyed part to the chipper building where it is chipped in sizes suitable for digesting, and part to the grinder room where it is ground into "ground-wood." The chips pass from the chipper building into large storage bins where they are fed by gravity into large metal tanks lined with cement oil acid proof brick and through the agency of sulphurous acid and steam are cooked or digested for a period of seven to twenty-four hours depending on the grade of sulphite required; from thence the sulphite is blown, using the steam pressure of 110 lbs. required in cooking, to large receiving tanks called "blow tanks," where it is washed clean of all acid.

Another portion of the chips is fed by gravity into rotating metal tanks of smaller size which contain the sulphate liquor under steam pressure and this is likewise cooked from 2½ to 6 hours, depending on the grade required. When cooked the resulting pulp is blown into washing tanks, which leaves the clean pulp required.

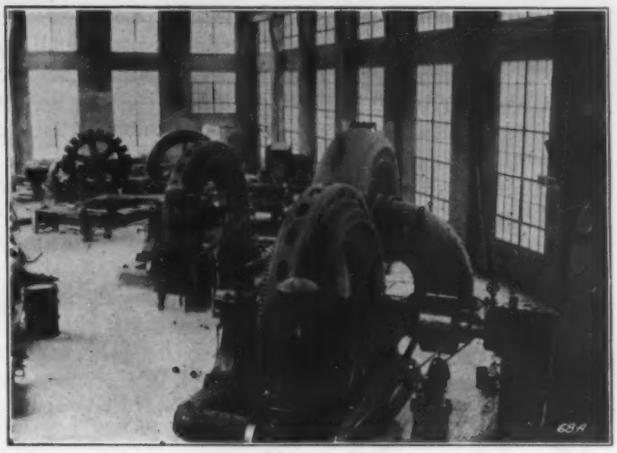
The sulphite is used in news print and the sulphate for making wrapping paper of unusual strength. The trade name for the latter is "Kraft."

The blocks that go to the grinder room are placed into pockets of the grinder and by hydraulic pressure are pressed against fast revolving stones about 54 inches in diameter which separate the small fibres of the wood. This wood is then pumped into storage chests for further manipulation.

As the sulphite and ground wood are used in the process of making news print we will follow these through briefly to the machines. The ground wood is pumped from the storage chest to a screen which recovers the coarse fibres; from thence to the Deckers which removes about 6/7 of the water, and from thence to a ground wood chest which is drawn in as required before pumping to the Beaters.

The sulphite is pumped from the blow tanks to the unscreened sulphite chests, from thence to the "Knotter," from the Knotter to the "Slushers," a machine which screens out the usable sulphite, and from the Slushers to the screened chests and thence to the Beaters as required.

The Beaters mix the ground wood and sulphite in proper proportions and here the size analine, alum and other ingredients may be added. The Beaters



The power house in process of construction. 8850 h.p. are generated in the larger of the power houses and meets all regular needs, power house No. 2 being used as an auxiliary plant.

both mix and further refine the fibres. From the Beaters the pulp passes to another storage chest from which it is pumped through the Jordan for further refinement to another storage chest. From these chests it is pumped to the Voight screens, thence to the floor box and thence into the "wire," a fine mesh bronze screen which is endless and carries the pulp to the rolls. The majority of the water is removed when on the screens and the paper which is now taking form is conveyed in a woolen felt through three sets of press rolls, leaving which it passes over a series of hot rolls which dry the paper. Finally it passes through the calendars, a stack of heavy chilled iron rollers one above the other, giving the paper finish, whence it passes to the winder where it is rolled into large rolls. The large rolls are passed into the finishing room where they are rewound into rolls, the size of which depends on the size required for marketing.

The sulphate or kraft paper closely parellels the making of newsprint except that there is no ground wood mixed with the sulphite, it passing on to the machine wire after a series of refinements only. The finished kraft is brownish in color and remarkably tough.

After rewinding the rolls of both news print and kraft in the finishing room they are carefully weighed and wrapped and are then taken to the large paper warehouse to await shipment. About 225 tons of paper a day are produced at Ocean Falls.

AN ELECTRICALLY DRIVEN FILTER

BY E. J. RICHARDS

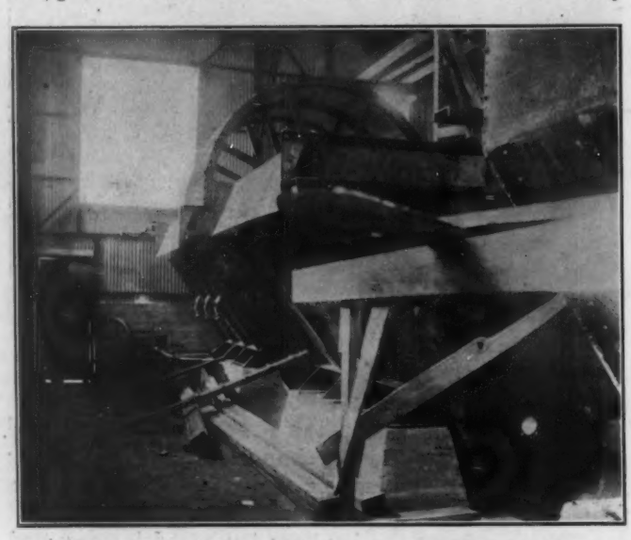
(A brief description of one of the many applications of electricity to the mining industry. The Oliver filter which is a western invention, is of special interest as one of the factors which has helped to revolutionize mining practice by making the flotation process possible. The author was formerly chief electrical engineer with the Arizona Hercules Copper Company and in charge of the construction and operation of this plant.—The Editor.)

An electrically driven filter plant using the Oliver continuous filter system is used by the Arizona Hercules Copper Company at their concentrating mill near Kelvin, Arizona.

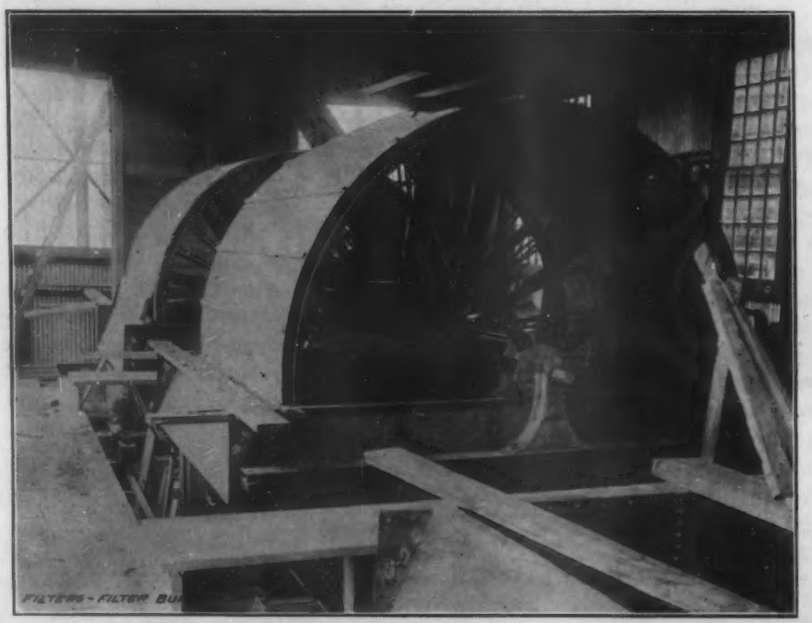
The filter equipment is housed in a steel frame corrugated iron covered building located below and a short distance from the mill building, permitting the pulp to flow by gravity to the various settling tanks and main pulp storage tank. This storage tank is of concrete construction located at the south end of the building, the pulp being elevated to the filters by a bucket conveyor.

Three 12 ft. by 8 ft. filters manufactured by the Oliver Continuous Filter Company of San Francisco, are installed with the necessary auxiliary equipment. This consists of vacuum pumps, in duplicate, for extracting the surplus water from the pulp; necessary centrifugal pumps with storage tanks for returning this water to the mill tanks; air compressors for forcing the partially dried pulp from the filter canvas together with necessary shafting, pulleys, belting, etc.

The operation of this filter possesses many features of interest. The filter consists of a drum, clearly shown in the cut, the surface of which is covered with canvas held slightly distant from the drum by narrow wooden slats or bridges spaced about 1 inch apart around the surface of the drum. This forms an air space of approximately ¾ inch between the drum and the canvas and this air space is connected by radial pipes to a communicating valve on one end of the shaft. This valve is connected, by piping, to the vacuum and pressure pumps and the slow revolution of the drum automatically connects part of this piping to the vacuum system and part to the pressure system. About ¾ to ⅞ of the surface is under vacuum and slowly sucks the pulp onto the surface of the canvas, gradually building up a layer of concentrates about ¼ to ⅜ of an inch in thickness and absorbing the water and moisture from same during its travel. For the last ⅛ to ¼ of the revolution the pipes—and surface of the canvas—are subjected to air pressure which gradually loosens the partially dried pulp or cake from the canvas and allows it to be scraped off by the apron or cutting edge.



The filter being installed. About ¾ to ⅞ of the surface of the drum is under vacuum, the remainder under pressure. This alternately sucks up the concentrate and then, at the proper point, lets it fall again on to a belt conveyor.



THE FILTER, READY FOR USE

In this interesting invention the concentrate is filtered from the liquid contained in the tank, in which the lower portion of the filter revolves, by a suction process. When the pulp, or ore, is thus deposited on the canvas, during another portion of the revolution of the drum it is blown out from the canvas and deposited in a receptacle designed for this purpose.

All of the above machinery is driven by a 50 horsepower 2300 volt motor located at the north end of the building and belted to the above mentioned line shaft.

In the building are also located 2 two stage centrifugal pumps each driven by a direct connected 25 horsepower 2300 volt motor used for pumping water from the settling tanks to the main mill storage tanks located above the mill, and from which the water flows again, by gravity, to the mill for grinding and flotation purposes.

From the aprons of the filters the partially dried pulp, in cakes, drops onto a 20 inch belt conveyor and is carried either to the concentrate bin or directly to cars for shipment to the smelter. This conveyor is driven by a 7½ horsepower 440 volt motor.

These three filters are designed to handle the concentrate from the three sections of the mill, which has a capacity of handling from 1200 to 1500 tons of ore per day. The filter delivers the concentrate in a condition containing not more than 8 to 12% of moisture.

Since the appearance of the first article of the author entitled "Electric Generation by Diesel Engine" in the Journal of Electricity, February 15, 1919, inquiry has been made as to the list of manufacturers that had a part in furnishing the material for this installation, the first of its kind in the West. The following is a list of those furnishing the major materials and apparatus for the Arizona Hercules Copper Company connected with this work:

Steel Buildings and Tanks—El Paso Bridge & Iron Co., El Paso, Tex.
Power House Generators and Switchboard—General Electric Company.
Mill and Mine Motors—Westinghouse Electric & Manufacturing Co., General Electric Co., Wagner Electric Manufacturing Co.
High Tension Transformers—Wagner Electric Manufacturing Co.
Machine Shop Tools—Manning, Maxwell & Moore.
Gyrating Crusher—Allis-Chalmers Manufacturing Co., Milwaukee.
Shafting, Pulleys etc.—Dodge Manufacturing Co.
Steel Poles and Towers—Bates Expanded Steel Truss Co., Chicago.
Flotation Equipment—General Engineering Co., Denver.
Hoisting Ropes—A. Leschens Sons Co., San Francisco.
Marcy Mills—Mine & Smelter Supply Co., El Paso.
Filter Equipment—Oliver Continuous Filter Co., San Francisco.
Conveyor Equipment—Webster Manufacturing Co., Tiffin, Ohio.
Mine Hoist—Nordberg Manufacturing Co., Milwaukee, Wis.
Belting and Conveyor Belt— J. E. Robertson & Co., Mills Bldg., El Paso.
Compressor—Ingersoll-Rand Co., Los Angeles.
Motor Generator Sets—Westinghouse Electric & Manufacturing Co.
Centrifugal Pumps—Cameron Steam Pump Co., Los Angeles; Byron Jackson Iron Works Co., San Francisco; Krough Manufacturing Co., San Francisco.
Electric Locomotives—Westinghouse-Baldwin.
Diesel Engines and Auxiliaries—McIntosh & Seymour Corp., Auburn, N. Y. (Sheldon Bldg., San Francisco.)

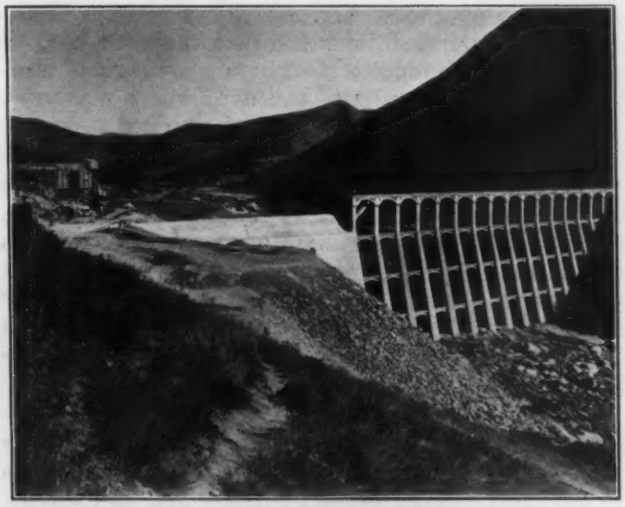
RECENT MULTIPLE ARCH DAMS

BY JOHN S. EASTWOOD

(The multiple arch dam has made a distinct place for itself in water and water power development, as peculiarly fitted to meet the needs of certain locations. The following is a compilation of data on four of the most striking of this type of structure erected during the past two years. The author is the originator of the so-called Eastwood type of dam.—The Editor.)

Four dams of the Eastwood multiple-arched type have been built in San Diego county within the past two years which embody features of importance, in particular as showing comparisons of cost and other features of great interest to the engineering profession and to prospective builders of dams.

The limited space will not allow detailed descriptions, and as the type has become quite familiar,



THE LAKE HODGES DAM
The dam is 136 ft. high and 750 ft. long, with 25 buttresses and arches, besides the open spillway cut into the mountain side.

only an outline description of each is given, the interesting features of each being given, also some side lights on the comparative costs of structures for water storage that will interest all readers.

The Murray Dam

The Murray dam, named in honor of the principal owner of the company, Mr. James A. Murray, was built by the Cuyamaca Water Company to increase the storage provided by the old La Mesa dam, which was the first hydraulic filled dam built in California. The old La Mesa dam was 65 feet high and created a storage basin in a dry wash debouching into the San Diego river, forming a distribution reservoir for the old San Diego Flume Company, later the Cuyamaca Water Company.

During the extreme floods in this vicinity in January, 1916, when the Lower Otay, a filled dam, went out with great loss of life and property, when the south dyke of the Sweetwater reservoir went out and the water cut around both ends of the single-arched masonry Sweetwater dam and was within six inches of taking out the Morena dam, a rock fill dam, the old La Mesa dam lacked only a foot of overtopping, and was only saved by the heroism of the attendant at the dam. The open spillway was insufficient to carry the excess waters from the local drainage while the sluice gate, a geared valve gate, was closed. The gate is located at the base of the dam and required a long time to open. Had the water overtopped the dam in even a small amount it would have been fatal to the dam, the attendant and much life as well as property in the wake of the flood. The danger was imminent and great, the act of staying to open the gate was heroic, the Scotch lady, Mrs. McQuarrie, who opened the gate amid the swirling waters, was a heroine, and deserves a medal for a heroic act.

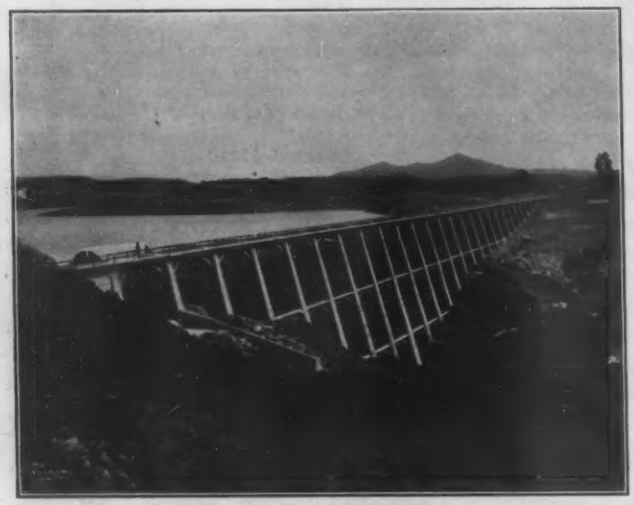
The old dam had sagged down in the middle, showing settlement due to undermining, and the danger of loss led to the building of the present Murray dam.

It was also planned to greatly increase the storage capacity and to make it a storage as well as distribution reservoir, so that the new dam was planned and built 35 feet higher than the old dam and even with the top of the ridge on the south end.

The dam is an Eastwood multiple-arched dam of a design to fit the conditions of shape and dimensions of opening with the highest efficiency. It consists of 30 arches of 30 foot span, is 117 feet high at the extreme point and 900 feet long overall. The slope of the front or arched water face is 1 to 1 or 45°, and the rear of the buttresses 28/100 to 1, being uniform from top to bottom, while the arch rings are provided with a 12 foot vertical head.

Heavy strut-tie beams, arch-supported, are provided for stiffening the buttresses, besides which there are counterfort buttresses or wings at the rear ends of the buttresses, the top beam being widened to four feet and provided with a railing for a foot walk over the entire length of the dam.

All strut-tie bears are heavily reinforced with steel rods, tied together, hooped and trussed in



THE MURRAY DAM

30 arches of 30 ft. span—900 ft. in length and 117 ft. high at the extreme point. This dam is designed to increase the storage of the old La Mesa dam which was threatened by the flood of January, 1916.

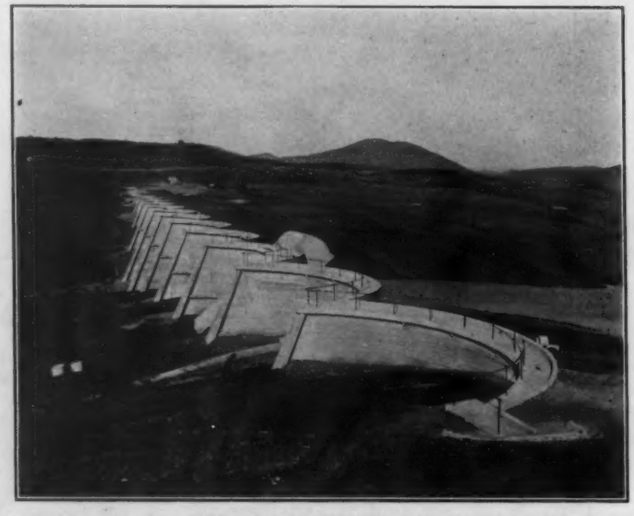
standard reinforcing methods for the purpose to be attained.

The tops of all arch rings are provided with a heavily reinforced cope on the front edge of which is placed a 12 in. wave cope, for the dam is planned to store to the level of the top of the cope and foot walk, in other words to be 100% efficient in storage capacity.

The stresses used throughout are 325 lb. per square inch or 23.4 tons per square foot. The arch rings are all heavily reinforced with steel rods tied to rods projecting from the buttresses, and the percentage is greatest at the top of the structure, the 9 inch vertical head having the greatest percentage of reinforcement.

A self-charging siphon spillway, having a capacity of over twice the flood inflow of the flood of 1916 is placed in the last bay on the north end of the dam and will regulate the level of the reservoir within 3 inches of the top of the main cope, the lip of the spillway being on the same level as the top of the cope, thus maintaining the storage capacity at 100% efficiency. The self-charging spillway is particularly adaptable to the multiple-arched type of dam for the reason that it requires very little in the way of additional walls and the openings are well shaped for the highest efficiency of inflow.

The dam is partly located on the porphyritic dyke that passes through this part of the country and partly on the old beach hardpan of cemented conglomerate, which occurs on the south end of the structure.



THE SAN DIEGUITO DAM

This dam was built in less than four months in spite of adverse labor conditions. It is 633 ft. long on the crest and 52 ft. high, with 13 buttresses and connecting arches.

All walls were taken down to sound rock and all foundations were passed by the engineering department of the State Railroad Commission of California, as well as by the writer, and the tightness of the dam and its foundations indicate the care used in getting good foundations. There is no sign of leakage through the walls of the dam where plastered, and a very small seepage through the bed rock.

The work was begun in April, 1917, and completed in January, 1918, taking seven months to build, and was put in service for the runoff of 1918, having water up to the base of the vertical head in February, 1918. The winter of 1917-18 was a very dry one and it was impossible to fill the reservoir to a height greater than 91 feet on the gage which was done within 30 days after the dam was completed.

In connection with the excavation of the foundations a very interesting feature was that as the room was scant, the new dam was placed as close to the downstream toe of the filled dam as possible, necessitating the cutting away of a part of the toe of the old for the upstream toe of the new dam, but no sooner had the top paving been removed, when the sandy material of the filled dam began to flow as quicksand into the space excavated, being in fact after all these years, merely the same quicksand

it was when placed. It being unsafe to continue the excavations for fear of losing the old dam and the water supply, the small excavations were back filled with rock to hold the sand from flowing, and the toe of the new dam was carried down vertically in timbered trenches, clear of the old dam.

The dam was designed by the writer, for the Cuyamaca Water Company of San Diego, which is owned by James A. Murray, Wm. G. Henshaw and Col. Ed. Fletcher, and was built by the Sharp and Fellows Contracting Company on a unit basis, under the direct charge of F. M. Faude and later under Mr. Bartl.

It is one of the most complete, economical, efficient and satisfactory dams of the many of this type designed and built by the writer.

It has a minimum safety factor of 10 or is 1000% strong, has stable equilibrium or balanced loading, has cost less than any dam of its size in the world, is at the same time five times as strong as a masonry dam, has been tested by service and the most severe earthquake in recent years, and has not a single crack in it.

The Eagles Nest Dam

The Eagles Nest dam is located in the hills above the Warner Hot Springs and was built to create a small fish pond and to hold a small amount of water for a lighting plant to be put in for the Hot Springs hotel and cottages.

When compared with other dams it is a small one but is of interest as being the first of its kind built, being what the writer designates as a Matilija or Butterfly dam, owing to its plan shape, and is in reality a triple-arched dam. It is not the first designed for one of this type was designed for the South Feather Land and Water Company by the writer.

It is the economical type for small openings, and in this case the opening is 125 feet wide and 38 feet deep, so the dam is designed to close the opening with the least material, the end arches being of 25 foot span each and the central arch having a span of 70 feet. The end arches have radii of 15 feet and the central arch 48 feet, giving it an arc of 93° 40′.

A cope three feet wide covers the tops of all arches and is supported by brackets. The south abutment is a granite rock and the north one is of concrete. Old cables were used for reinforcement and were laid in as the work progressed. As showing the economy of this refined design for the place, the total concrete is but 184 cubic yards, while the stress is only 267 lb. per square inch or 19.2 tons per square foot, showing that there is no need of mass for strength if the design is scientific.

The San Dieguito Dam

The San Dieguito dam is a part of the distribution works of the San Dieguito Mutual Water Company's system for irrigation of the lands of the San Dieguito Rancho and other lands along the coastal plain adjacent. It forms the distribution reservoir, enabling the delivery of the water to be stored in Lake Hodges dam to be distributed without interruption and with an efficient conduit system.

The structure is a multiple-arched dam, very much like the Hume Lake dam in size and design. It is 633 feet long on the crest, 52 feet high, and consists of 13 buttresses and connecting arches, the spans being 50 feet, the arc of the water face 120°. A cope 4 feet wide runs the full length of the arches and is provided with a hand rail, forming a foot walk across the dam. There are no strut-tie beams, the buttresses being stiffened by the use of counterfort buttresses of generous size.

A self-charging siphon spillway is provided having a large capacity to take care of any floods from the local drainage area when the reservoir is full. The lip of the spillway is even with the top of the cope, a wave cope giving it a 12 inch freeboard, and the structure will store to 100% efficiency.

The excess water that may come through the conduit is automatically spilled over the sides of a flume on the line, located in a rocky canyon so that at no time will the reservoir be filled higher than the spillway lip from the stored water.

This dam was built in less than four months by Bent Brothers, contractors, on a lump sum bid for the dam complete, and the remarkable thing was that they did it at a fair profit despite the worst kind of labor conditions for 79% of the lowest bid for an earth fill for the same site with all the earth at hand for the fill.

Lake Hodges Dam

Lake Hodges dam was originally called the Carroll dam, the name it now has being in honor of Mr. W. E. Hodges, vice-president of the Santa Fe Railroad who are the principal owners of the water company. It is located in the narrow notch where the San Dieguito river passes through the porphyry hills, about 7 miles from the town of Escondido and about 40 miles from the city of San Diego.

The Lake Hodges dam is a multiple-arched dam designed to meet the conditions of configuration at the site, and was bid on in competition with two other types for the same location. It is a large dam, being 136 feet high and 750 feet long overall. The opening being wide at the bottom makes it large at its base and as the bedrock was mostly exposed, a small span of 24 feet center to center was used as being the economic span.

There are 25 buttresses and arches besides the part of the open spillway cut into the mountain side. The main portion of the dam has a vertical head of 10 feet and the front slopes are 1 to 1 or 45°, while the rear is steep in order to clear the overfalling water from the rollway part of the spillway, while at the same time maintaining stable equilibrium.

At the rear of the rollway portion a deck is placed over the whole space between the buttresses to prevent the water from the spillway running back underneath the dam. All of the open has counterfort buttresses at the rear and all parts are tied together with strut-tie beams, arch supported, and all heavily reinforced.

One of the lower tier of strut bears is widened to 4 feet and is used as a foot walk for inspection and to reach the outlet and sluice gates. The top strut is also designed as a foot walk and this at the end of

the spillway is connected by means of a stairway with a walk on a level with the tunnel under the spillway. As there would be no way to reach the gates from the north side, where the attendant must stay (as the south side is a precipitous mountain side), this tunnel terminates in a tower and a stairway leads up to the top of the tower and out to high ground beyond.

The open spillway is 360 feet long and 15 feet deep and is capable of passing a flood of 78,000 cubic feet of water per second. There are four 24 inch sluice gates placed in one of the lower arches and provision is made to draw off the service water at four different levels. On account of the level at which the water is to be used, there is a large dead head area and about 2000 acre-foot capacity is below the draw-off point. The capacity of the reservoir up to the lip of the open spillway is 44,000 acre-feet and to the top of the crest at elevation 330, the capacity is 76,000 acre-feet.

The dam was erected by Bent Brothers, contractors of Los Angeles, under the direction of Mr. E. W. Case, chief engineer, C. E. Holyoke, resident engineer, on a unit basis, the cement being furnished by the company.

The San Dieguito Mutual Water Company of which Col. Ed. Fletcher of San Diego is president, Mr. W. E. Hodges vice-president, and Mr. E. O. Faulkner secretary-treasurer, are the owners.

ELECTRICAL GOODS IN JAPAN

(With the end of the war, business is looking to opportunities in foreign markets as well as at home. The present status of the electrical industry in Japan and the possibilities of American trade with that country along electrical lines is interestingly told in these brief extracts from a report of R. A. Lundquist, trade commissioner of the Bureau of Foreign and Domestic Commerce, who made investigations of the electrical business in the Far East for the government.—The Editor.)

In this country if a person wants a telephone installed in his home or office he is incensed if, on telephoning to the company in the afternoon of one day it is not done by the morning of the day following. In Japan, if we are to believe a newspaper of Tokyo, it appears that in the fall of 1917 there were 153,000 subscribers awaiting installation of apparatus, "some of them having waited for more than 10 years." It also appears that when a subscriber is willing to give up his wire he offers it to a broker who has a long list of buyers and the number is sold through one of these buyers for anywhere from 500 to 1,500 yen ($250 to $750). To show that these prices are not exaggerated an amusing instance is given, in a book now being used by the Bureau of Foreign and Domestic Commerce, where as high as $750 had been asked for a number that could have been had for less.

This monograph of something over one hundred pages substantially bound, as well as illustrated, is entitled "Electrical Goods in China, Japan, and Vladivostok." It is written by R. A. Lundquist, Trade Commissioner of the Bureau of Foreign and Domestic Commerce, who visited those countries to make an investigation of the electrical business for the government.

Mr. Lundquist states that Japan has shown a wonderful electrical growth in the last 10 or 15 years. Central-station systems have been established in great numbers and service has been extended to all parts of the country. Official figures indicate there were 658 in July, 1917.

The development is greater than the figures indicate, inasmuch as many of the stations are hydroelectric and supply a considerable number of cities and villages. Japan, therefore, has been a large consumer of electrical goods. A few years ago these were imported, but the strong home market that was opened up brought about a development in the manufacture of all kinds of electrical apparatus, equipment, supplies and accessories, and now the country is becoming a competitor in certain lines instead of a customer of the United States.

An idea of the growth of electrical manufacturing in Japan is shown by data from the trade returns of that country from which it appears that in the item of insulated electrical wire alone there was imported in 1912 an amount in excess of $2,693,000. In electrical machinery the import in 1911 amounted to nearly $3,000,000.

Up to September, 1917, there were 530 power and light systems in Japan, 42 electric tramways, and 48 railway and lighting systems. The figures also show there has been a strong development in public-service systems in that country in the last few years. In addition to the systems mentioned there were in 1915, 1,609 private plants and 121 government-owned plants, with 53 of the former and 6 of the latter under construction.

It appears that in 1915 there were 3,051,925 families using electric lights, and there were 39,310 power consumers with 42,789 motors, and 13,680 more classified as isolated or government-owned plants, while in 1916 there were 76 municipal or private electric railways in operation.

Heretofore American manufacturers have sold the largest percentage of generators, switchboards and switch gear. While switchboards and switch gear are turned out by Japanese works, they have not made the progress in these lines generally that they have in the apparatus lines. Americans should be able to sell higher-voltage equipment and considerable of the instrument and relay requirements for the boards that are made up locally.

Japanese engineers follow American transmission and distribution practice quite closely. Line construction, switching stations, and sub-station arrangements are generally similar to those employed in the United States, except in a few instances. It is estimated that there is about 20,000 miles of "extra high pressure" lines in operation.

The United States, Germany, and the United Kingdom have until the last few years furnished most of the requirements in motors and controlling devices, but since 1913 Japanese motors have been coming into the market more and more. While there are a few fair Japanese motors, the writer does not believe they will give continuous satisfaction as an average American motor will.

The import figures for ammeters and voltmeters show American goods leading strongly. Schools and central stations have bought high-class American testing instruments to a fair extent.

In wattmeters the United States has had a good trade for some years. American alternating-current meters in normal times cost more than foreign makes, but are better, though at present American meters are meeting foreign prices closely.

There is some small opportunity for the sale of higher-class American wiring supplies, such as flush push switches, receptacles, fancy shades, semi-indirect lighting units, etc., for use in new modern-type buildings.

There is not much opportunity for arc lamps. Street lighting is the greatest field for that kind of lamp, and in Japan there are not many wide streets, so that the demands in this line are limited. The incandescent lamp is more suitable for the average narrow-street lighting conditions, where low candle-power units are all that are required.

One class of goods that will probably find a market in Japan for a time are those that are used in connection with electric signs. The Japanese appear to be taking up electric signs to an increasing extent and appreciate the use of electricity for advertising purposes. It is believed that patented types of sign sockets, flashers, etc., will find an increasing sale. Fittings for outline lighting should have a small sale also, and some flood lighting was seen in operation.

This little book, which is adequately illustrated, closes with an account of conduct of trade with Japan, banking facilities, monetary system, weights and measures, customs tariffs, terms, business methods, packing, representation, trade-marks and patents, together with a description of the manufacture of electrical goods in Japan.

An account of opportunities for exporting electrical goods to Chosen and Vladivostok is also given.

FOREIGN TRADE VALUE OF AMERICAN MAGAZINES

BY GEORGE A. LOGAN

(The following extract from a report of the consul at Penang, Straits Settlements, tells the story of what the Journal of Electricity means in the Far East. There have been numerous inquiries from consulates and elsewhere in China, Russia, Australia and Japan and the magazine is today well represented in each of these countries.—The Editor.)

American magazines are famous for the excellence of their subject matter, the attractiveness of their typography, and the reliability of their advertising pages. They are not, ordinarily, found on sale in Penang book stores, as there is little call for them, because the reading public generally has not made their acquaintance.

At the suggestion of this consulate a bookseller in Penang placed an order a few months ago for three well-known American publications, and has since increased the list and number of copies, besides taking some subscriptions. The magazines personally subscribed for by the consul and those sent to the consulate by the publishers are in constant demand.

Small Mail Orders Often Lead to Larger Business

This office knows of several mail orders which have been sent to advertisers in American publications, with satisfactory results. When the goods are received the purchasers talk about them and show them to their friends. Dealers soon find it profitable to stock the advertised articles, especially if the exporters assist them with advertising in the local press and otherwise.

Magazine advertising usually brings from foreign countries individual mail orders at first. They are often from persons connected with business houses and are frequently in the nature of trial orders, although that fact may not appear.

A Penang druggist recently ordered for personal trial a device for stropping razor blades which he had seen advertised. Finding it satisfactory, he purchased a lot for his store through a commission house which handles most of his American trade. Within two weeks after delivery all were sold and a larger order was placed. The druggist's experience was that by using this device he obtains two or three months' service from a blade that ordinarily would be good for only a few shaves. He knew that such an article would be a boon to men on plantations and tin workers who are far from town.

American Magazines for Foreign Reading Rooms

It would pay the manufacturer of a magazine-advertised article to inquire of those magazines which carry his advertisements whether their publications go to public libraries, consulates, commercial associations, clubs, and similar institutions which maintain reading rooms in the territory served by the foreign buyers of his line; and if not, to arrange that they be sent to such organizations. Each advertiser who did this would be doing valuable missionary work for American trade in general as well as for his own business. This might be done co-operatively through trade associations whose members are interested in foreign trade. The magazines which entered into such an arrangement would thereby extend their influence, increase their subscriptions, and make more effective their service to advertisers and readers.

Such publications of high standing are very useful in placing properly before the intelligent readers of other countries American thought, ideals, institutions, and policies. In these days of increased interest in American affairs that is of important ethical and commercial value.

INFLUENCE OF FORESTS ON WATER POWER SUPPLY

BY ALFRED A. GRIFFIN

(The melting of the snow determines in large measure the flow of the Western rivers—and in consequence in large measure the water power available at various seasons. The influence of forest covering in prolonging the period of melting is here interestingly suggested in extracts from a report presented to the U. S. Weather Bureau. The author is forest examiner of the Portland, Oregon, district.—The Editor.)

In order to find with some definiteness the effect, if any, of forests in representative portions of the Cascade Range on the melting of the winter snow cover, the Forest Service carried out studies of snow melting on three separate watersheds: The Tumalo area in central Oregon, the Wind River area in southern Washington near the Wind River Experiment Station, and the Yakima area on the head-

Looking across the fork of Tumalo Creek. Some dense timber appears on the left, but most of the forest cover is very light.

waters of that river in central Washington. These locations permit the studies to show the value of forests to the irrigation and power interests, as well as to furnish a basis for comparing the effect of forests of this region with those of other regions.

The studies on the Tumalo area were carried through both the 1916 and 1917 seasons entirely by

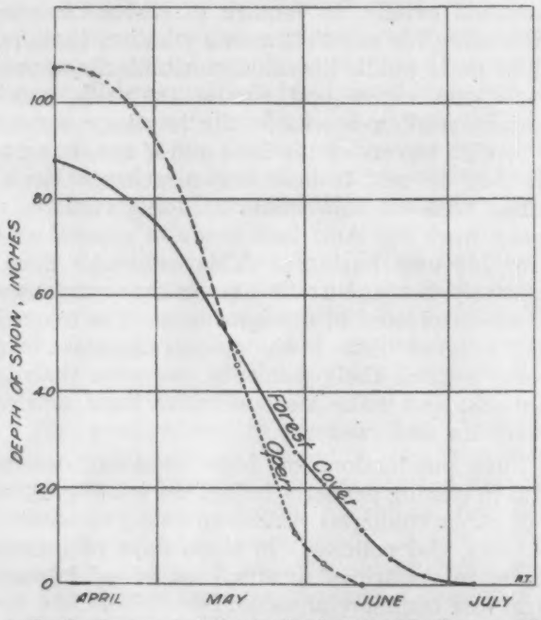


Fig. 1—Depth of snow at station in the forest and in the open, Yakima watershed, 1917

Forest Examiner W. J. Sproat of the Deschutes National Forest, those at the Wind River Experiment Station area by the writer in 1916, and by Forest Assistant C. J. Kraebel and Ranger A. E. Kloe in 1917; and those on the Yakima area, carried on in 1917 only, were conducted by Deputy Supervisor W. F. Ramsdell and Ranger W. G. Hellen, both of the Wenatchee National Forest. In each study the depth, density, and distribution of the snow cover were observed throughout the melting season at 8 to 20 typical observation points or stations.

Data Collected

Full reports for each of the studies are available in the Forest Service files. For the sake of brevity

Small mounds of snow beneath the forest litter show how this has protected the bank from melting

and clearness the results are given here, summarized by areas studied.

Tumalo.—The four pairs of stations observed on this area in the spring of 1916 were typical of small burns or open areas of from 1 to 4 acres in extent, and the immediate borders of the adjacent stands of mature timber. The greatest average depth of snow measured in the timber was 121.2 inches on April 5, 10 inches less than was measured in the open on the same date. On June 22 the first open station became bare of snow; on July 18 no snow was left on any of the stations in the open. As the snow disappeared from the individual stations in the open there remained at the corresponding forested stations an average of 19.3 inches of snow. At an average density of 45 per cent, this is equal to 8.7 surface inches of water; 2.1 inches, about 25 per cent, still remained two weeks later at the time of the last observation.

In the spring of 1917, with slightly less snow and a briefer melting season, the equivalent of 5.2 inches of water was retained by the forest-covered stations after the "open" stations became bare; at the end of the second week all were bare. In 1917 observations included eight pairs of stations, the new open stations being in larger openings.

Wind River.—The results for 1916 in the densely forested Wind River region are as follows: From a maximum average depth of 70.8 inches of snow[1] an average of 28.2 inches remained at the forested stations as the corresponding stations in the open became bare. Part of this remained for six weeks longer. The retarding effect of the forest cover was twice as strong on the deeply snow-covered mountain slopes as on the flat. About 66 per cent of the maximum

[1]Average of flat and mountain slopes.

water equivalent was conserved on the one and 38 per cent on the other.

In 1917 administrative exigencies permitted complete examinations of only three pairs of stations on the flat. The maximum average depth of snow in the forest was 25 inches. The stations in the open became bare in April, leaving an average of 6.2 inches at the stations in the forest. This was equal to 3 inches of water, or 40 per cent of the maximum water equivalent.

Yakima Area.—The observations on the Yakima watershed cover the melting season of 1917 only. From a maximum of 88 inches of snow at the forested stations in early April, there was still an average of 19 inches left at each forested station when the corresponding station in the open bare—about June 1. This snow, equal to 6.9 inches of water, gradually melted during the next four weeks.

[1]Water equivalents are shown in Table 1.

Correlation of Results

Table 1 summarizes the water value of the snow cover retained by the forested areas. The 7.5 inches of water equivalent, found to be the mean for all

One of the Wind River stations in the open—snow gone for over a week—April 12, 1916. This shows the brush land which the study considers as open land.

stations, lasted on the average for 17 days and at some forested stations for more than 42 days. The value of the forests appears to be greatest on Wind River, and in 1916, probably because of the high mountain slope stations with deep snow mantle under heavy forest cover, and least on the Tumalo area, under the "dry slope" conditions.

The curves of figure 1 show graphically for the Yakima study the more rapid melting at the open stations and the proportion of snow retained at the

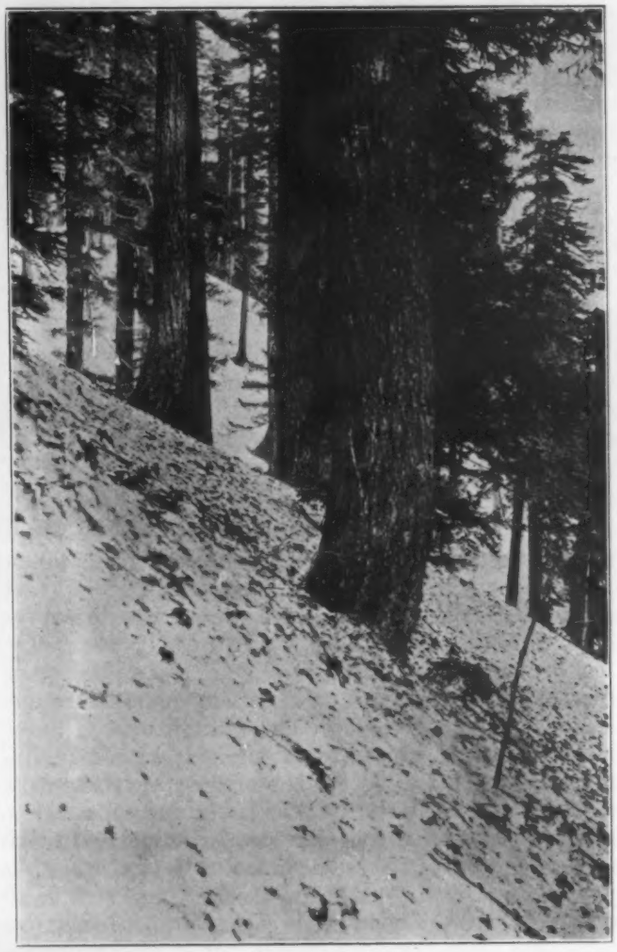
TABLE 1.—The water equivalent of the mean depths of snow retained by the forested stations when the corresponding open stations became bare, and for three weeks thereafter, expressed in inches and in per cent of the maximum snow cover.

Study.	Max. water equivalent	Weeks after stations became bare. 0		1		2		3	
Tumalo, 1916	47.0	8.7	18	6.0	12	2.1	4	....	....
Tumalo, 1917	44.0	5.2	12	0.1	....	....	....	....	....
Wind River, 1916[1]	25.8	13.5	52	9.5	37	8.0	31	5.3	21
Wind River, 1917	7.6	3.0	40	0.6	8	....	....	....	....
Yakima, 1917	24.6	6.9	28	3.2	12	1.6	7	0.3	1
Mean	29.8	7.5	30	3.9	14	2.3	9	1.1	4

forested stations. As shown in Table 1, similar curves drawn for each of the other areas would tell very much the same story. The curves given also bring out the frequently observed fact that during the early spring there is a greater depth of snow at the stations in the open than at those under timber. This condition existed on the other areas excepting at high altitudes at Wind River where dry snow with less sunshine seems to have permitted a larger proportion of the total snowfall to reach the ground under the trees.

Comments.

The most important weaknesses of this study lie in the short period covered by the observations—two seasons at the most, and in small practically unavoidable differences in the site factors of the stations of each pair. Because of the severe conditions and amount of labor necessarily involved, it quickly appears that a long series of complete and accurate



The corresponding Wind River Station in the forest on April 12, 1916. Under the forest cover there is still over 50 inches of snow, equal to nearly 2 feet of water.

observations will be quite expensive. Such measurements might possibly be made in connection with annual snow surveys for irrigation purposes. The irregularities in factors of the stations are balanced through the selection of a considerable number of stations (54) in the different regions and by three different men.

Drifting by the wind was of comparatively small importance throughout the study. Very large and deep snow drifts occur on comparatively small areas near the summit of the Cascade Range, but are not found on the middle slopes or on these areas. The lesser blowing and drifting of snow, chiefly in the open areas, appears to be practically self-compensating.

The results of this study are in general accordance with Swiss figures quoted by Fernow[1]—that the retardation of snow melting in forests is 5 to 8 days in general and may be several weeks—and also with the observations of Church. In agreement with the latter is the tendency of the snow in the forest to be deepest and last longest in the small openings of the denser forests. This tendency was especially noted on the Wind River area and may partly account for the late melting of the snow in the small open areas characteristic of the Tumalo area. In large openings the protecting influence from the forest would be dissipated and melting consequently more rapid.

An unusual factor in delaying the melting within the Douglas fir type of forest is the protection given by the irregular layer of even very slight bits of moss, twigs, bark, and other litter weathered from the trees. Fragments like those shown in the picture, which in the open would materially hasten melting by absorbing solar heat, in the forest serve as a crude but effective insulation from the warmer air currents above the snow. In a more open forest this effect is less prominent.

An opposing influence appears in the ability of the bushes, tree trunks, and other large objects to hasten melting by radiating or reflecting into the snow the heat which they receive from various sources. Hollows or bare spots around trees, etc., are frequently noted in the spring. They seem to be important in all coniferous forests but especially in those of the yellow pine type.

Application of Results

Expressed in irrigation terms, the figures given in Table 1 mean that on the areas studied the average square mile of forest cover retained the equivalent of between 720 and 160, averaging 400, acre-feet of water in the form of snow after the open areas had become bare. Neglecting losses through seepage and evaporation, the average of 400 acre-feet is sufficient supply for about 150 acres of cultivated land for the entire season, or for about 650 acres for one month during the peak of the irrigation season (during the summer low-water period). Of course some loss is to be expected in the natural flow of the water down to the lower valley; but it will, at a time when the ground is already saturated, be much less than the normal loss. It is also probable that some of the water will flow down stream too early to be of greatest use in irrigation. Making considerable allowance for these losses, it appears that the forest cover is a very important and very valuable factor in increasing water available for irrigation.

In terms of time, the effect of the forests was to spread the 400 acre-feet of retained snow through a period averaging 17 days in length. The retardation of this amount of snow is sufficient to be of great importance to irrigation interests, especially as it is generally understood that a forest cover tends to "flatten out" the crest of a flood, and thus to increase the minimum flow at periods of low water. A forest cover thus supplements the possible artificial reservoirs. This study furnishes measurements, however, not of stream flow but only of the material out of which stream flow is made.

[1]Fernow, B. E., Forest Influences, Bull. 7, Div. of Forestry, p. 137.

THE ELECTRIFICATION OF SEED

Some five plants for the treatment of electrified seed-corn were installed in England by the beginning of 1918, according to a recent article in the London Electrical Review. The seed is treated by being placed in a tank containing liquid chemicals. The tank is connected up to the electric supply, and immediately the seed is placed in the tank the electricity is turned on, and passes through the grain, the process continuing from three and one-half to six hours, according to whether the seed corn is barley, wheat, or oats. At the expiration of the period required to treat the seed, the current is switched off, and the grain is conveyed from the tanks to a kiln—up to the present a malt-kiln has been found the best—and is dried at an even temperature. The seed is then packed up and sent out to the farmer.

Nearly 2,000 acres of electrified seed-corn were harvested in 1918. One farmer grew as much as 300 acres, while others ranged downwards to as low as one acre.

So much has been said in the past concerning the application of electricity to farm crops, that it was only to be expected that a considerable amount of interest would be taken in the results of the 1918 harvest of grain grown from electrified seed, and much criticism brought to bear on the process.

An investigator — not appointed by the patentees nor by any person interested in the process— took measurements of the standing corn, which was cut in his presence, and he afterwards conducted the threshings himself. The results of his investigations were as follows:—

W. W. Lovelace, Piddlehinton, Dorchester, gain on wheat from the produce of electrified corn over untreated, 12 bushels per acre.

C. Foot, Bincombe, Dorchester, gain on wheat, 6½ bushels per acre.

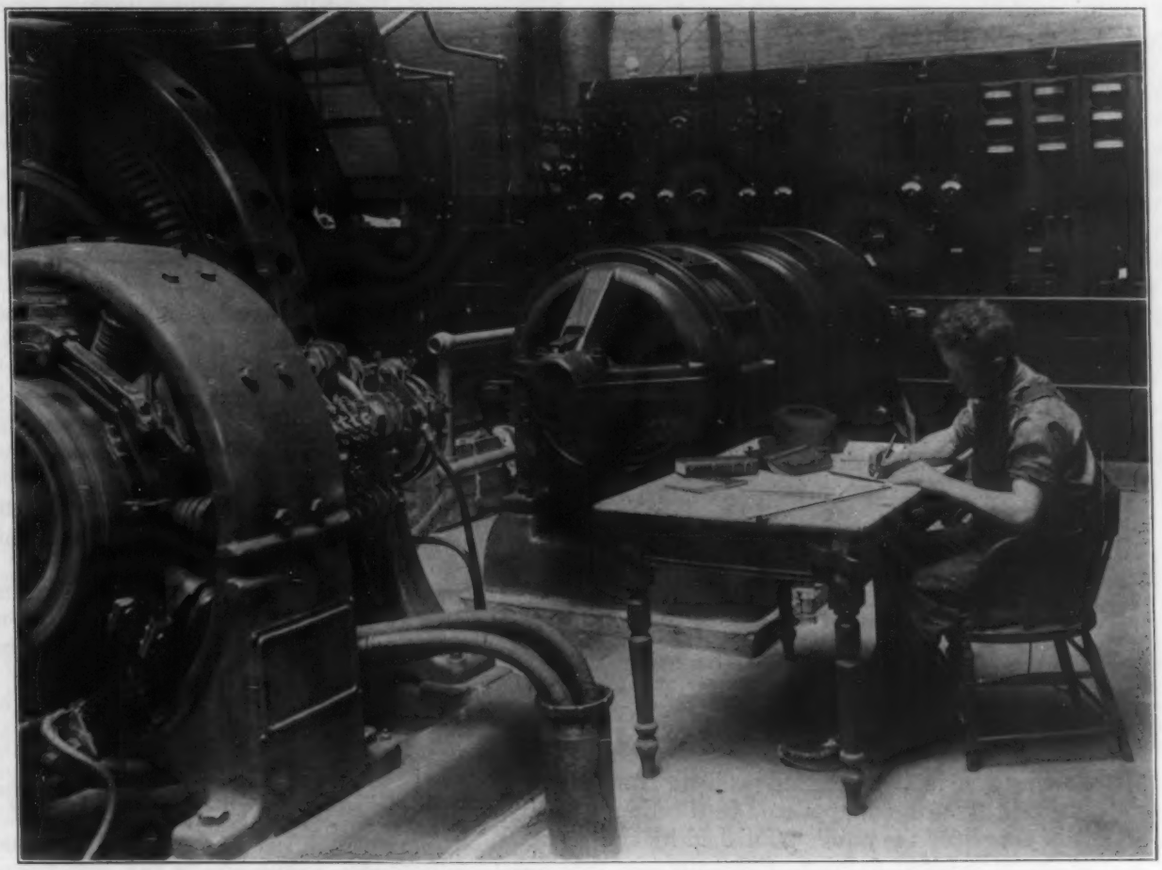
H. J. Cake, Burton, Dorchester, gain on barley, 16 bushels per acre.

W. W. Lovelace, Piddlehinton, Dorchester, gain on oats, 5 2/3 bushels per acre.

A PRACTICAL COURSE IN ELEMENTARY ELECTRICITY

BY H. H. BLISS

"Know the fundamentals" is the cry of the hour. Here is the beginning of a series of discussions in the columns of the Journal of Electricity in cooperation with the Extension Division of the University of California on the all-important subject of elementary laws of electricity. The forwarding of this undertaking is a matter that strongly appeals to every member of the electrical industry—manufacturers, jobbers, central station men, electrical contractor-dealers—and it is receiving hearty endorsement from all quarters. The California Electrical Cooperative Campaign, now nationally recognized as one of the most helpful institutions of its kind in existence, has endorsed the series. Amplified discussions and helpful problems in addition to the matter herein published will be forwarded and your efforts later corrected by the Extension Division. You may enroll for this correspondence course by paying a fee of five dollars to the Extension Division. The text for the course is the Journal of Electricity, an annual subscription for which is two dollars and a half. The author of this series is in charge of technical instruction for the Extension Division at the University.—The Editor.)



Spare moments in the power station are put to good use in the study of electricity. This practical course in which the Journal of Electricity cooperates with the university will be taken advantage of by power operators, telephone men, electrical salesmen and office workers—in short, it will be of great assistance to workers in all lines of endeavor connected with matters electrical.

Beginning with the next issue of the Journal of Electricity there will be published in each number an article on some phase of electrical study. The series of fifteen papers is prepared in the Extension Division of the University of California and forms part of an extension correspondence course, as explained in detail below.

Following is a list of the subjects of the articles:

(1) Ohm's Law and the Electric Circuit.
(2) Series and Multiple Circuits.
(3) Power — Losses — Efficiency.
(4) Electromagnets — Transformation of Energy.
(5) Wire Calculations.
(6) The Generator.
(7) Armature and Field Windings.
(8) Losses and Reactions in Generators.
(9) Electrolysis — Batteries.
(10) Direct Current Motors.
(11) Motor Characteristics.
(12) Electric Meters.
(13) Lamps and Illumination.
(14) Interpole Machines.
(15) Suggestions for Increasing Personal Efficiency in the Electrical Industry.

The instructive material of the series and of the accompanying correspondence course is arranged to meet the needs of those who have to do with electrical apparatus, circuits or power. It is therefore of importance to station operators, office employes, salesmen, contractors, dealers, jobbers, telephone and telegraph men, manufacturers' employes, repairmen—in fact, to all who are connected with the electrical industry.

Each article will deal with one subject in a general way, and thus the series will constitute a text explaining fundamental principles. In order to be of help to those who have not made a study of electrical theory, the language and descriptions will be made as simple as possible, taking for granted no special knowledge on the part of the reader.

As stated above, these papers constitute an integral part of a new University Extension correspondence course in Electricity. Journal readers who enroll with the Extension Division of the University of California will receive, for each of the fifteen lessons of the course, several pages of mimeographed instruction supplementing each article. These lessons go into detail concerning circuit and machine characteristics, efficiencies, applications of principles and electrical calculations. Each lesson contains examples of the simpler computations, and a list of ten or more practical problems which students may solve for home study and submit to the University for criticism and correction. After the problem sets are read, they will be returned to the senders, together with answer sheets showing the instructor's method of performing each computation.

For the services rendered in connection with the correspondence course the University is obliged to make a charge of $5.00. This is the entire cost of the course to readers of the Journal of Electricity. Those interested may enroll by writing to the University of California Extension, Berkeley, or to the office of the Journal of Electricity.

WHAT IS A FAIR RETURN?

(A ten per cent profit on gross earnings may mean a two per cent return on the investment—or vice versa, depending on the nature of the business. A brief explanation of why the public utility must ask for a higher rate is here reproduced which very concisely clears up a point on which most people are inclined to be hazy. This is a sample of the type of advertising which is helping to educate the public. —The Editor.)

The following analysis of the rate problem from the standpoint of a fair return appeared in the Electogram, a little paper for the public published by the Puget Sound Traction Light & Power Company:—

Men go into business to make money. The business that offers the best profits at the least risk to the capital invested and requiring the least capital to launch is the most attractive to investors. But while profits and amount of capital required are factors that receive large consideration, risk is a factor that probably outweighs all others. The new and untried business offers the largest risk. A proved business the least. So into all business enters as the final and determining factor the rate of return.

It has become a fixed policy to say that a public utility like a street car system shall be permitted to earn only a "fair return." Then the question arises: What is a fair return? That is not always easy to determine, but public service commissions and courts have taken a short cut and said that it must be a fair rate for the actual money invested. The public, without knowing much about it, usually accepts that rule. As between private business and public utility business there is a wide difference when the rate of return rule is applied.

Many private businesses requiring an investment of not to exceed $1,000 can do an annual gross of $10,000. If that yielded a net of only $1,000 it would mean 10 per cent on the gross, but it would be 100 per cent on the investment. That would not be considered excessive by anyone. In the public utility field, however, an annual gross business of ten times the total investment is not possible. It is usually the other way around, and the capital investment required must be from five to eight times the possible gross business done, which is to say that a public utility must invest $100,000 approximately for every $15,000 to $20,000 of annual gross.

But—a net of 10 per cent of gross, in that case, would mean a net return of only two per cent or less on the actual dollars invested in the business, while a net return of 5 per cent on the investment would require from 20 to 40 per cent of the gross annual revenues.

It would be obviously impossible to secure capital to build street railway systems, interurbans and power and lighting plants for a two per cent return, and in times like these equally impossible on a five per cent return.

By common consent any business man or private industrial or merchandising corporation seems to be permitted to earn any rate of return on the actually invested capital possible so long as it is done by honorable dealing. Only public utilities, rendering a public service, are restricted in this respect by limiting them to what approximates a going rate on the best and safest securities.

Any other private business is permitted to make earnings that bear some definite relation to the magnitude of the investment required and the increased ratio of risk as the investment increases.

Usually a public utility is a monopoly, and when it is the risk is not so great. That seems to have had much to do with fixing the general rule of a "fair return" as interpreted by commissions and courts. If the public had a better understanding of the amount of money required to establish and conduct a public utility, the magnitude of the investment in comparison with the relatively small gross income and the actual relation of what appears to be a large net profit to the investment, then the public could appreciate the fact that the rate of return which a utiliy can earn is very small—much less, in fact, than the average critic of a public utility would be willing to accept as an interest rate on his own money, even if secured by gilt-edged first mortgage on income real estate.

A public utility in a growing city is a growing business, requiring constant supplies of new money in order that it may develop and meet its obligations and responsibilities to the community.

A FAIR RETURN is that rate of return which will induce investors to voluntarily put their money into the utility—a return that will provide money as it is needed for the growth and development of the utility.

SPARKS—Current Facts, Figures and Fancy

(A movie film of glass, a plan for saving fuel by burning refuse, another origin of the peace league idea, and a story of an electrical escape from a German prison camp are among the items of interest. Few people know that the method of obtaining potash from cement dust originated in a plan to clear away the fog—nor that Mr. Dun was the first bill collector. —The Editor.)

When you "dun" a person for an unpaid bill, do you realize that the word was really the name of a man, an Englishman called John Dun, who had such success in collecting bills that his name passed into current phrase and became a synonym for collecting a bad debt?

* * *

A motor-driven machine for cleaning drawings is one of the latest conveniences for the drafting room. The machine is driven by a variable speed motor which can be attached to any electric light socket and will operate on either direct or alternating current.

* * *

A knowledge of electricity came in handy with one American prisoner in the German prison camp at Karlsruhe. Lieut. E. V. M. Isaacs of the U. S. Navy escaped one dark night by short-circuiting all the lighting circuits of the camp, and escaping through the barbed wire under cover of darkness.

* * *

Another origin of the peace league is that the idea upon which President Wilson is now working was first given to the world by that good old Quaker, Governor William Penn of Pennsylvania, in the year 1694. He suggested that the peace of the universe could easily be maintained by a congress of nations and the scheme which he then outlined is substantially the same as that suggested by the President. Penn first printed his views on peace in The Old South Leaflet in 1694 and the article appears in No. 25 of that periodical.

* * *

It is reported that a new method for producing motion pictures by projection through a glass film (as distinguished from the usual commercial film of celluloid) has been worked out at Jena, Germany. This new glass film has the advantage of being only one one-hundredth as large as the film now in use. This so-called glass "film" is in reality a very thin plate of glass, upon which the necessary number of prints are made, and which is shifted mechanically before the arc. It is not known whether this method of projection is in commercial use.

* * *

During the visit of the Inter-Allied Petroleum Council of this country in the latter part of November, it was revealed for the first time that a pipe line had been laid across the neck of Scotland, through which oil fuel could be pumped in a cold state at the rate of about 100 tons per hour. At one end 16 huge tanks have been constructed with a holding capacity of a thousand tons, and at the other end the oil falls into reservoirs easily accessible to the fleet from its base at Rosyth. The pipe is 8 in. in diameter and there are two intermediate pumping stations.

* * *

For the purpose of encouraging the agriculturists of Sweden to participate in the movement for the further development of hydroelectric power, an association was formed last spring, consisting of representatives of electric power companies and rural societies. The aim of the association is to furnish advice and information relative to the distribution of energy, and to render financial assistance in the purchase of electrical apparatus. A typical example of developments of the nature contemplated is the purchase of a waterfall by a group of farmers in order to obtain electric power for their farms.

* * *

It is claimed that the whole of the refuse collected from houses (such as ashes, cinders, paper, straw, and vegetable matter) can be dealt with and turned into fuel, thus conserving the coal supply. The inventor assumes that in a community having a population of 100,000 there would be 25,000 tons annually of refuse, and he shows that the sale of the prepared fuel, even when marketed at a low price, would result in considerable revenue and profit. He adds that, besides being a means of providing a valuable fuel out of material now wasted, the briquets can be used for domestic and steam-raising purposes and thus save the whole of the present cost of disposal.

* * *

The obtaining of potash from cement dust was more or less of an accident. A number of years ago an instructor in the department of chemistry of the University of California devised a process for dissipating fogs and mists by means of a high tension electrical discharge. This process, first used for cleansing the air of acid particles that were a nuisance and a monetary loss in various acid factories and metallurgical works, and then for purifying air of dust and other small particles, has become a most important industrial process and is used all over the world. It was installed at a cement factory at Riverside to eliminate dust. When the dust was examined it was found to contain potash; a method was developed to collect it, and the method is now used all over the United States in potash production. Already it has changed the character of some of the cement mills—potash is now the main source of profit, and cement is merely a by-product.

PERSONALS

Fred A. Williams, born on a farm in Harrison County, Iowa, June 13, 1877, has recently entered service as a member of the Public Service Commission of Oregon. After going through the country schools and finishing a preparatory course at the Woodbine Normal, Mr. Williams entered the University of Iowa at Iowa City in 1895, graduating with the degrees of Ph.B. 1899 and LL.B. 1900. Immediately after graduation he entered the practice of law at Council Bluffs, Iowa, came to Oregon in 1906, and has been practicing at Grants Pass, Oregon, since 1908, in partnership with George W. Colvig, who was a member of the first Railroad Commission of the State of Oregon. Mr. Williams was nominated on both the Republican and Democratic tickets May 17, 1918, at the primaries for the office of Public Service Commissioner for the state at large, and was elected to the office at the general election the following November.

C. S. Northcutt, of the Sierra and San Francisco Power Company, Modesto, was a recent San Francisco visitor.

G. J. Kuhut, manager of the Los Angeles street railway system, with his wife spent some days in San Francisco recently.

James F. Lincoln, general manager of the Lincoln Electric Company with headquarters at Cleveland, Ohio, is a recent San Francisco visitor.

H. Asami, a graduate engineer of Kioto University, Japan, is a recent San Francisco visitor who is interested in hydroelectric power plants operating under high heads.

Warner Marshall of Boston, president of the Washington Coast Utilities with offices in the New York building, Seattle, recently visited the Seattle office on business of the company.

Burton Gibson, representative of the Edison Electric Appliance Company, Inc., has left for the Hawaiian Islands to represent the three divisions of his company, with headquarters both at Honolulu and Hilo.

H. L. Aller, general manager of the Pacific Gas & Electric Company of Phoenix, Arizona, is a recent San Francisco visitor. **W. C. Hornberger,** general superintendent of the company, accompanied Mr. Aller in his visit.

J. V. Painter, sales manager of the Appleton Electric Company of Chicago, is a recent Pacific Coast visitor. He has recently spent some days in San Francisco in consultation with his Pacific Coast representatives, Keeler, White Company.

C. E. Magnusson, head of the department of electrical engineering at the University of Washington, Seattle, is a recent California visitor, where he attended at Berkeley the sessions of the Pacific Coast Conference of the National Research Council.

H. E. Bixby of the Burley Electric Company, prominent engineers and contractors of the Idaho district with headquarters at Burley, has been spending a few days in San Francisco on business relating to contracts they have in hand in connection with electrical machinery for irrigation work.

W. R. Hendry of W. R. Hendry Company, 314 Hoge building, Seattle, district agents for Delta Star Electric Company, Whiting Foundry Equipment Company and other interests, is making a five weeks' business trip through the East, including in his itinerary Chicago, Pittsburgh, New York, Boston and Des Moines, Iowa.

Walter E. Conklin, whose past experience has been along lines of business efficiency, cost accounting and office management, has been engaged by the Jaggar-Sroufe Company of Portland, Ore., as business manager. Mr. Conklin is putting into effect a carefully developed system of accounting adapted to the electrical business.

Mason B. Starring, head of the eastern company that controls the United Railroads of San Francisco, was a recent visitor in that city where he took up the matter of the financial reorganization of the corporation with the other members of the reorganization committee—Frank B. Anderson, William H. Crocker, Herbert Fleishhacker, I. W. Hellman, Jr. and John D. McKee.

J. G. De Remer, formerly vice-president and chief engineer of the United Light & Power Company of San Francisco, subsequently consulting engineer for the American District Steam Company and recently with the U. S. Shipping Board as a member of the ship protection committee, has returned to San Francisco where he intends establishing a research laboratory to investigate various electrical and mechanical problems which he formerly had under way in New York City.

Dr. Ohsuke Asano has been granted the title of Professor Emeritus by the Tokyo Imperial University. He is the first electrical engineer to receive this title in Japan. Prof. Asano's career has been unique in promoting the growth of electrical science and industry in Japan. His forty years' service to his country in various capacities has been well known and the present honor is a most appropriate and deserved one for him. Prof. Asano is now a member of the Board of Directors of Waseda University and the Dean of the College of Engineering of the same institution.

H. L. Garbutt, manager of the line materials section of the Supply Department of the Westinghouse Electric & Manufacturing Company, is a recent Pacific Coast visitor. While in San Francisco Mr. Garbutt delivered a most interesting and instructive talk to representatives of his company and to a number of engineers prominent in high tension power development in this section of the West. The talk was at the San Francisco Engineers' Club rooms and covered the salient features of important research investigations in the insulator problems that have recently been undertaken by his company.

H. H. Jones, general manager of the San Diego Consolidated Gas & Electric Company, as chairman of the general convention committee for the Coronado Convention of the Pacific Coast Section, N. E. L. A., has been in San Francisco recently to perfect arrangements in the northern district of California for attendance at the convention of an unusually large number of delegates. San Diego lingers in the memories of Pacific Coast men as a place of hospitality and a place well worth visiting when Mr. Jones and his company are to be the hosts. Many still recall the enjoyable and profitable convention of the Pacific Coast Gas Association which met under Mr. Jones' guidance at San Diego in the fall of 1912. The character of the papers and the enthusiasm already displayed over the forthcoming convention at Coronado April 30-May 2 augur well for a thoroughly representative gathering at this place from all sections of the West and even from many quarters of the East.

Curt C. Davis, field representative of the California Electrical Cooperative Campaign for the San Francisco Bay district, although only recently appointed upon this work, is already arousing interest in his district and compiling much helpful data that will be of great assistance in forwarding the work of the campaign during coming months. As a graduate of the University of California, a former representative of the General Electric Company and later of the Pacific Hardware & Steel Company, Mr. Davis comes to his new position well acquainted with its problems and well prepared to be of invaluable assistance in their successful solution.

Guy W. Talbot, president of the Pacific Power & Light and the Portland Gas & Coke companies, is recuperating from serious operations at the St. Vincent's hospital of Portland.

Samuel Hubbard was recently elected to fill the vacancy in the directorate of the Pacific Telephone & Telegraph Company caused by the death of F. W. Eaton, former treasurer. **George A. Newhall** succeeds F. G. Drum, who retires.

G. J. Guivers, formerly secretary of the Utah Association of Electrical Contractors and Dealers, is now located with the Pocatello Electrical Supply Company, who have taken over the management of the Butte Electrical Supply Company.

Melvin C. Osborn, for twelve years commercial agent for the Washington Water Power Company, has resigned. Mr. Osborn came to Spokane from Butte, Montana, where he was associated with the Butte Electric Company. Prior to that time he was associated with commercial enterprises in California.

G. W. Shaner, formerly with the Westinghouse Electric & Manufacturing Company with headquarters in San Francisco, is now with the Utah-Idaho Central Railroad at Ogden, Utah. This company is building a new substation equipment at Ogden that has a motor-generator set of special windings, an interesting description of which will appear later in the Journal of Electricity.

Ralph Elsman, formerly connected with the Pacific Gas & Electric Company, has recently been elected vice-president of the Kings County Lighting Company, Brooklyn, N. Y. Mr. Elsman has been general manager of the company, which office he still retains, and his elevation to the vice-presidency comes as a recognition of his service for the company and incidentally for the industry as a whole. Mr. Elsman spent nine years on the Pacific Coast and during that time made many friends throughout the West.

Lieut. Col. A. H. Griswold, plant engineer for the Pacific Telephone & Telegraph Company, who was in charge of all American communication work back of the trenches both in England and France, was the guest of the San Francisco section of the A. I. E. E. at a luncheon on Friday, Feb. 28th. Colonel Griswold is preparing a formal paper on this subject which is to be given before the A. I. E. E. in April.

Clarence R. Young, sales manager of the Pacific Power & Light Company, Portland, Oregon, has accepted a position in the Securities Department of the Electric Bond & Share Company at New York. Mr. Young has been with the Pacific Power & Light Company for the past eight years and has held the following positions: Chief clerk to the purchasing agent, chief clerk to the vice-president and general manager, and sales manager. He graduated from Stanford University as a civil engineer in 1910.

OBITUARY

E. H. Jacobs, construction engineer and superintendent of all distribution lines of the Western States Gas and Electric Company in Stockton, died recently as a result of influenza, which was followed by pneumonia.

JOINT CONVENTIONS AT CORONADO

Plans for a most successful convention of all electrical interests at Hotel del Coronado April 30-May 2 are rapidly being shaped under the direction of H. H. Jones of San Diego, chairman of the convention committee.

Announcement is made that the National Electric Light Association will be officially represented by Mr. R. J. McClelland, chairman of the National Hydroelectric and Technical Section, and chief engineer of the American Power and Light Company. Col. H. M. Byllesby is planning to be present and is scheduled for the principal address at the banquet. Paul M. Lincoln, past president of the American Institute of Electrical Engineers, will also be in attendance.

The California Association of Electrical Contractors and Dealers have appointed the following members to cooperate with the convention: C. L. Chamblin, Chairman, T. J. Bennett, R. V. Oyler, G. E. Arbogast and F. J. Somers.

The Pacific Division Electrical Supply Jobbers' Association will hold their meetings May 28-29, so as to leave the rest of the week for attendance on N. E. L. A. meetings.

Some spectacular aviation exhibits are planned as a special attraction to those attending the meeting. These, in conjunction with the sports and trips for which San Diego is famous, will add much to the enjoyment of the convention.

THE SCENE OF THE CORONADO CONVENTION

A view of San Diego harbor from Point Loma—Coronado is in the distance. Not only is the program to be one you cannot afford to miss, but weather conditions and surroundings are promised as ideal and a host of entertainment features will keep you busy in every spare moment you happen to have. Don't forget **The Occasion** — Joint Conventions of California Association of Electrical Contractors and Dealers, Pacific Division Electrical Supply Jobbers' Association, Pacific Coast Section N. E. L. A. **The Place**—Coronado Hotel. **The Time**—April 30 to May 2.

MEETING NOTICES FOR ELECTRICAL MEN

(An interesting discussion of the proposed bill for licensing electricians in California formed a recent program at the San Francisco Development League. Progress in the state association of contractors and dealers and plans for the victory convention at Vancouver and the big Pacific Coast event at Coronado further marked events of the past two weeks' period.—The Editor.)

Vancouver Convention

The spring convention of the Vancouver Association of Electrical Contractors and Dealers is planned for May 26th and 27th. The event is announced as the greatest convention ever held in western Canada. Samuel A. Chase is to attend and W. L. Goodwin is counted upon to be present. The work of organization is rapidly taking shape and the names of all central stations, manufacturers and contractor-dealers west of Winnipeg have been secured with a view to holding a wide-open convention. May 27th being Empire Day in Canada, there will be excursion rates from all parts which will be acceptable over the convention dates.

Northern California Contractors and Dealers

A meeting of the Northern California Association of Electrical Contractors and Dealers was held in Oroville during February. Those in attendance were W. H. Gribble and W. S. Cass, both of Chico; H. Berg and C. Iverson, both of Marysville; E. Russell of Colusa and G. A. Dahlmeier of Oroville. Matters of the trade were discussed.

San Francisco Section A. I. E. E.

Arrangements have been made with the Engineers' Club of San Francisco by which a luncheon table is reserved on Wednesdays for any members of the A. I. E. E. who wish to be present.

Oregon Society of Engineers

The subject of Coal was taken up at the March 3rd meeting of the Oregon Society of Engineers, held in Library Hall, Portland, Ore., at 8 o'clock. "Coal is King," a four-reel motion picture, was presented by the National Association of Stationary Engineers, which illustrated the economical use of fuel in power plants. A further attraction was offered members on March 1st, when a personally conducted tour around the new Municipal Grain Elevator was opened to them.

Conference of California Irrigation Districts

The State's plan to construct storage reservoirs for the purpose of impounding water for irrigation and for the development of electric power was endorsed at a meeting of the Irrigation Districts of California, in session at the Sacramento Hotel. The organization further recommended the passage of a bill allowing irrigation districts to establish and conduct power plants and to distribute electricity where it can be done in connection with irrigation projects.

Oregon Association of Electrical Contractors and Dealers

The regular meeting of the Oregon Association of Electrical Contractors and Dealers for District No. 1 met at the Imperial Hotel on Monday evening, February 10, 1919. The state of the association committee reported having held a conference and suggested certain rules to be followed by the committee in its work, and Mr. Green outlined a system of discounts that was based upon the quantity purchased which was thereupon discussed and explained, and the committee was instructed to proceed with their deliberations.

Under unfinished business the matter of the Friday page was discussed and upon motion it was decided to discontinue the page for the reason that not sufficient time could be given to editing it. The secretary was instructed to write the Abstract Record a letter thanking them for past favors.

Under new business the secretary reported having been approached by a Mr. McIntyre with the Own Your Home campaign who had asked that a committee be sent to interview in regard to submitting approximate costs on wiring the houses they intended building. The matter was referred to the Wiring Committee and the chairman, F. A. Bauman, instructed to call upon Mr. McIntyre at once.

The matter of issuing warrants for minor violations of the Electric Code and the question of fire alarm systems were referred to appropriate committees to be taken up more definitely at a later meeting.

A regular meeting of the society was held on March 10th at the same place. A number of important matters were considered, among them the specifications for fire alarm systems proposed by the wiring committee. The object was to eliminate the vagueness of the present ordinance and to meet the real intention of the measure.

BUILDERS OF THE WEST—XLIX

JULEAN ARNOLD

The West, not content with building a vast empire of industrial, agricultural and commercial wealth for the lightening of human burdens within its confines, is today represented by its sons in distant lands of the Pacific to a degree that portends the early building of an even greater, more extensive and more helpful sphere of usefulness. To Julean Arnold, commercial attache to the great Republic of China, a young man of broad vision and of great potential force in development of helpful commercial interchange with our oriental neighbors, this issue of the Journal of Electricity is affectionately dedicated.

Mining Convention

An international mining convention is to be held at Vancouver, B. C., on March 17, 18 and 19. The meeting will attract a large representation of mining men from the northwest territory and from Alaska. A large attendance of Canadian mine operators and engineers is expected to be present. The speakers will include some of the leading mining engineers and experts of the United States and Canada.

A. S. M. E.—Western Sections

The western visit of Calvin B. Rice, president of the A. S. M. E., is to be the occasion of several pleasant gatherings in his honor. Mr. Rice plans to entertain A. S. M. E. members in the various cities through which he passes. The two western sections at Los Angeles and San Francisco are holding special meetings in his honor. He was the guest at the March 13th meeting of the Los Angeles section at Hotel

Clark. The address of the evening was "The Behavior of Steels Under Test" delivered by Prof. Ford of Throop University. The San Francisco section plans a special luncheon in honor of Mr. Rice at the Engineers Club on March 22.

California Association of Electrical Contractors and Dealers

Several meetings of the California Association of Electrical Contractors and Dealers have been held since the first of the year at which much important business has been accomplished.

The application of the Southern California Association for membership in the National and State Association was considered at the executive meeting on January 9th. After considerable debate the matter was settled on the following plan: That the contractors and dealers were to form themselves into a section on the basis of annual dues at the rate of $2.00 per each one thousand dollars' worth of business done in 1917, and that all members of the State Association base their dues on the same plan.

A further resolution was made and carried that, should the 1919 business in any case be less than 1917, credits were to be extended.

The invitation of the president of the Pacific Coast Section N. E. L. A. to hold the second quarterly meeting of the association jointly with them at Coronado late in April or early in May was accepted, and every section of the state was requested to be represented. At a later meeting C. L. Chamblin, R. V. Oyler, G. E. Arbogast, T. J. Bennett and F. J. Somers were appointed on the committee to cooperate with the N. E. L. A. in this convention.

H. C. Reid presented his resignation from the Advisory Board of the California Electrical Cooperative Campaign Committee which was reluctantly accepted and the Advisory Board was requested to send a nomination to the executive committee as to a successor.

At the members' meeting of January 10th at Sacramento the following resolution was adopted after some discussion of the report of the special committee on supplies:

"That the Committee on Supplies is hereby instructed to enter into negotiations with a committee of the Supply Jobbers to the end that every effort be exerted to raise the standard of the industry to its most efficient point. That the Committee on Supplies be at all times under the direction of the Executive Committee."

The proposed amendment to the By-Laws relegating the president of the association to the office of State Representative was overwhelmingly defeated.

The question of preparing a pocket data book was taken up and the support of the members pledged.

H. C. Reid as retiring president was presented with the thanks and remembrance of the association and a token of their esteem in the form of a Hoover vacuum cleaner.

At the Retail Dealers' meeting, a plan of getting greater results from the work of the field agents of the California Electrical Cooperative Campaign was taken up. It was felt that the field men should advance new ideas along the lines of window dressing, also new ideas on merchandising, assist in planning of advertising, make investigation and reports on general resales, and if possible suggest new ideas on store arrangement as well as general market conditions existing in the territory.

They also felt that the field men would accomplish greater results if they, upon entering a field, would first call a meeting of all electrical merchants and explain their endeavors. In this manner it is believed that both the merchants and the field men would receive valuable suggestions.

It was suggested that the Executive Committee make preparations for a merchandising section to meet at each quarterly section.

A most enjoyable dinner was carried out by the Oakland and Berkeley members of the association at the Hotel Oakland on February 19th.

The San Francisco Electrical Development League

Perhaps the most helpful meeting ever undertaken by the San Francisco Electrical Development League was that of Monday, March 10, 1919, at the Palace Hotel luncheon. The meeting was given over to a discussion of the Master Electricians enactment now before the California legislature, known as Senate Bill No. 570. The meeting was largely attended and representatives from all branches of the industry were present in great numbers. The discussion lasted for four solid hours. The bill as discussed is printed in full below.

The trend of the discussion was unquestionably favorable to the passage of some bill that would enable inspection of electrical installation to become standardized throughout the state. It was felt that the bill as it stands confers too much power on the accident commission, especially in its authorization of the commission to revoke licenses without showing cause for action. The departments of electricity from several municipalities in the San Francisco bay region thought the bill should be corrected similar to the boiler inspector's law as now in vogue in California, wherein all existing machinery of inspection in the state is taken advantage of in putting into effect the provisions of the law. It was also emphasized that the powers of the commission should be centered more in specific rules for installation rather than the granting of general powers of supervision.

The following committee was appointed to go before the accident commission and the judiciary committee of the California legislature, to present arguments for remodeling the proposed enactment, or even to propose delay in its passage for a two year period, if deemed advisable:

S. J. Lisberger, chairman, electrical engineer, Pacific Gas & Electric Co.
C. F. Butte, president Butte Engineering & Construction Co.
W. S. Berry, western sales manager, Western Electric Co.
Leon Van Atta, Pacific States Electric Co.
J. F. Pollard, commercial department, Sierra & San Francisco Power Co.
E. O. Shreve, San Francisco manager, General Electric Co.
M. A. De Lew, president Cal. Ass'n Electrical Contractors and Dealers

The bill as it now stands in the California legislature is as follows:

An act to provide for the inspection of electrical work and electrical equipment, and to regulate the manner of installation of all devices used for the generation and consumption of electrical power in places of employment in this state: and to provide for establishing standards of electrical construction in such places: requiring a permit to be issued by the industrial accident commission for the use of electrical equipment and devices, making it a misdemeanor to use such equipment and devices without such permit: allowing an injunction against such use without such permit where dangerous to the life and safety of employees: providing for a hearing before the industrial accident commission before the refusal of said permit: providing for the qualification and appointment of inspectors and prescribing maximum fees for inspections, and providing for the licensing of master electricians and the collection of a fee for such licenses.

The people of the State of California do enact as follows:

Section 1. The following terms, as used in this act, shall, unless a different meaning is plainly required by the context, be construed as follows:

(1) "Industrial accident commission" and "commission" means the Industrial Accident Commission of the State of California.

(2) The term "place of employment" shall mean and include every place, whether indoors or out or underground, or elsewhere, and the premises appurtenant thereto, where, either temporarily or permanently, any industry, trade, work or business is carried on, or where any process or operation directly or indirectly related to any industry, trade, work or business, is carried on, including all construction work, and where any person is directly or indirectly employed by another, but shall not include any place where persons are employed solely in household domestic service, or any place of employment, concerning the safety of which jurisdiction may have been vested by state law in any other commission or public authority, and this act shall apply to such places of employment.

(3) The terms "equipment" and "electrical equipment" mean and include any and all electrical machinery, apparatus, appliances, devices, fixtures, fittings, materials, wires, cables, conductors and poles, pole lines for the transmission and distribution of electric power or energy for lighting, heating, power, mechanical or other purpose.

(4) The term "electrical work" means and includes the installation, construction, erection, connection, alteration and repair of any and all electrical equipment.

(5) The term "master electrician" shall be taken to mean an individual, a firm, a partnership or a corporation engaged in doing electrical work in this state.

Sec. 2. All electrical equipment in places of employment shall be so constructed, installed, operated, maintained and repaired that said electrical equipment will be safe and free from risk or danger of accident or injury to employees by fire, shock or otherwise.

Sec. 3. No electrical equipment shall be used in a place of employment without the written permit of the industrial accident commission for using such electrical equipment, and unless such permit shall remain in full force and effect. The use of such electrical equipment without such

permit shall constitute a misdemeanor, and each day of violation of the provisions of this section shall constitute a separate offense, **provided**, that no prosecution shall be maintained where the issuance or renewal of such permit shall have been requested and shall not have been acted upon. Whenever any electrical equipment is being used, without the permit herein required, and is in condition or is making conditions in places of employment dangerous to the life or safety of any employee employed or to be employed in any place of employment, the industrial accident commission, a commissioner or any person affected thereby may apply to the superior court of the county in which such place of employment is located for an injunction restraining the doing of electrical work or the installation or use of electrical equipment until such condition shall be remedied or removed. Proof by certification of the commission that such permit has not been issued, together with the affidavit of any electrical inspector of the commission that the conditions are, or will be, dangerous to the life or safety of any employee shall be sufficient ground for the immediate granting of a restraining order, for the granting of which no bond shall be required from the commission.

Sec. 4. The industrial accident commission shall cause inspection to be made of all electrical equipment in places of employment, and if conditions be found, upon such inspection, to be safe, as provided by the laws of the State of California and the orders of the industrial accident commission, a permit shall be issued by said commission for the use of said electrical equipment, which said permit shall be in full force and effect while said electrical equipment is being used, unless revoked for good cause. If such inspection shall show unsafe conditions the commission or a commissioner may issue a preliminary order containing such requirements as shall make safe conditions, and may order the use of electrical equipment to cease until any unsafe condition has been removed or remedied. Unless such preliminary order be complied with, a hearing before the commission, a commissioner or referee of such commission shall be allowed, upon request, at which all parties affected shall have an opportunity to appear and show cause why compliance with said preliminary order should not be made. If it shall thereafter appear to the commission that said preliminary order should be complied with, or that other things should be done to make such conditions safe, the commission may order the withholding of the permit to use such electrical equipment, and make such requirements as it finds proper for the correction of such unsafe conditions. Such order may thereafter be reheard by the commission or reviewed by the same courts and in the same manner as specified by the workmen's compensation, insurance and safety act of 1917 for safety orders, and not otherwise.

Sec. 5. Inspections herein provided for shall be made only by inspectors of the industrial accident commission or by inspectors employed by a city, city and county or county who hold certificates of competency issued by the commission. Such certificate may be issued by the commission after examination or other test of the qualifications of any person to make the inspections herein provided for, and may be revoked or suspended by the commission at any time. No charge shall be made for the issuance of such certificate of competency. No such certificate of competency shall be issued by any inspector of a city, city and county or county unless such city, city and county or county has adopted electrical safety standards equal to the minimum safety standards adopted by the commission.

Sec. 6. Nothing contained in this act shall be construed as a limitation upon the authority of the industrial accident commission to prescribe or enforce general or special safety orders. Said commission shall have power, authority and jurisdiction, upon following the procedure prescribed for the making and entering of general and special safety orders, in the workmen's compensation, insurance and safety act of 1917, to make and enter both general and special safety orders establishing standards for the performance of electrical work and for the installation and use of electrical equipment in all places of employment in this state, and such general orders and special orders shall have the same force and effect as is established by law with respect to the general safety orders and special safety orders made and entered under the safety provisions of the workmen's compensation, insurance and safety act of 1917.

Sec. 7. It shall be unlawful for any electrician, or any other person, to do electrical work, other than minor operating repairs, in places of employment, without a master electrician's license, provided this section shall not apply to any electrician directly employed by a master electrician.

Sec. 8. Every application for a master electrician's license shall be made in writing, in such form and detail as shall be prescribed by the commission, and in addition to any other information that may be required shall state the name and business address of the applicant and shall contain a statement that the applicant agrees that in the conduct of the business of doing electrical work he shall be subject to, and will faithfully comply with, all safety orders issued by the commission. The master electrician's license shall extend to cover electrical work by the holder of the license and any immediate employe of the holder, in good faith, who is working for and under the direction and supervision of the master electrician holding such license.

Sec. 9. A master electrician's license shall entitle the holder thereof, for a period of one year, unless sooner revoked, or suspended, to engage generally in the business of doing electrical work, but such license may be suspended or revoked for any violation of any law enacted for the safety of employees in places of employment, or of any general or special safety orders issued by the commission for safety in places of employment, or for any other cause deemed to be good and sufficient by the commission. The holder of a license shall be responsible for all work done and acts performed thereunder, and it shall be unlawful to lend or transfer said license.

Sec. 10. A license tax of twenty-five dollars shall be paid in advance to the industrial accident commission for every master electrician's license issued hereunder. Such license tax shall be paid into the "accident prevention fund."

Sec. 11. Within forty-eight hours, exclusive of Sundays and legal holidays, after the installation of any electrical equipment the master electrician shall give notice to the commission, in manner and form prescribed by it, that said equipment is ready for inspection.

As soon after receipt of any such notice as is reasonably practicable, the commission shall cause an inspection to be made of such electrical equipment. If it shall be found that said work has not been done in conformity with safety laws and the safety orders issued by the commission, the commission shall condemn the same by withholding approval thereof, and shall give notice of such action to the master electrician, which notice shall state wherein the equipment or other work does not meet such requirements.

Within ten days after such notice, or within such further reasonable time thereafter as may be prescribed by the commission, said master electrician shall correct such installation or other work in all particulars wherein it shall have been found not to meet said requirements, and he shall immediately notify the commission when such correction shall have been made. The failure, neglect or refusal of such person to do so shall be deemed sufficient cause for the commission to refuse, and it is authorized and empowered to refuse, to issue the permit for the use of such electrical equipment until said installation or other work shall have been corrected and inspected and found to conform in all particulars with safety laws and safety orders.

Sec. 12. The industrial accident commission may fix and collect such fees for the inspections herein provided for as it may deem necessary, not to exceed ten dollars for the inspection of any one unit of electrical equipment and, within the limits set forth in this section, may devise a fee schedule to cover the details of inspection and may charge and collect fees for inspections according to such schedule, **provided** that no inspection fee shall be charged or collected by the commission under this act for inspections made by inspectors employed by a city, city and county or county who hold certificates of competency. Such fees must be paid before the issuance of a permit for the use of electrical equipment. All fees collected by the commission under this act shall be paid into the "accident prevention fund."

Sec. 13. This act shall be effective January first, nineteen hundred twenty.

WHERE THE MEN OF THE INDUSTRY MEET

(The place where you can find where and when the other man meets. Information as to changes in officers, or additions or corrections, should be addressed to the Service Editor, Journal of Electricity. It is hoped to keep this directory up to date, so that travelers in a strange town who wish to attend the meetings of allied groups may not be misdirected.—The Editor.)

A. I. E. E.—WESTERN SECTIONS

National Officers
President—Comfort A. Adams, Harvard University.
Secretary—F. L. Hutchinson, Engineering Socity Bldg., New York City.
Meetings—Monthly.

Los Angeles Section
Chairman—J. H. Cunningham, General Electric Co., Los Angeles.
Secretary—Clem A. Copeland, Bureau of Power and Light, Los Angeles.
Meetings—Second Tuesday of each month.

Portland Section
Chairman—R. M. Boykin, care North Coast Power Co., 441 Pittock Block, Portland, Ore.
Secretary—W. D. Scott, Pacific Telephone & Telegraph Co., Portland, Ore.
Meetings—Monthly.

Denver Section
Chairman—Fred J. Rankin, Colorado Pub. Utilities Com., Denver.
Secretary—Robt. B. Bonney, 603 Wyoming Bldg., Denver, Colo.
Meetings—Third Saturday of each month, from October to May, at the Denver Athletic Club. Dinner at 6:15 p.m., followed by regular meeting.

San Francisco Section
Chairman—J. C. Clark, Stanford University, Cal.
Secretary—Allen G. Jones, Rialto Bldg., San Francisco.
Meetings—Fourth Friday each month—Engineers' Club, 7 p.m.

Seattle Section
Chairman—John Harisberger, 4015—4th Ave. N. E., Seattle, Wash.
Secretary—T. C. Smith, City Lighting Department, Seattle, Wash.
Meetings—Monthly on third Tuesday in Chamber of Commerce Assembly Room, 9th floor, Arctic Bldg.

Spokane Section
Chairman—George Nixon, Main and Lincoln Sts., Spokane.
Secretary—G. H. Hoppin, 1128 W. Kiernan Ave., Spokane.
Meetings—Third Friday of each month.

Utah Section
Chairman—A. S. Peters, Mountain States Telephone & Telegraph Co., Salt Lake City, Utah.
Secretary—H. T. Plumb, 183 U St., Salt Lake City, Utah.
Meetings—Third Wednesday of alternate months, 8 o'clock. Assembly Room of Commercial Club, Salt Lake City.

Vancouver Section
Chairman—R. F. Hayward, Western Canada Power Co., Ltd., Vancouver, B. C.
Secretary—T. H. Crosby, Canadian Westinghouse Co., Vancouver, B. C.

A. I. E. E.—WESTERN BRANCHES

University of California Branch
Chairman—A. E. McMahon, University of California, Berkeley, Cal.
Secretary—D. D. Davis, University of California, Berkeley, Cal.

University of Colorado Branch
Meetings—First and third Thursdays of each month of the school year in the Engineering Building, University Campus.

Idaho University Branch
Meetings—First Wednesday evening of each month from October to June.

Oregon Agricultural College Branch
Chairman—Lawrence Fudge, Oregon Agr. College, Corvallis, Ore.
Secretary—Otto L. Cantrall, Oregon Agr. College, Corvallis, Ore.

Stanford University Branch

Montana State College Branch
Secretary—J. A. Thaler, Montana State College, Bozeman, Mont.
Meetings—Third Friday of every month of the school year in the Electrical Bldg.

Throop College of Technology Branch
Chairman—Mark Sawyer, Throop Dormitory, Pasadena, Cal.
Secretary—Russell Otis, Throop Dormitory, Pasadena, Cal.

State College of Washington Branch
Chairman—Clarence E. Guse, Pullman.
Secretary—Ralph C. Guse, State College of Washington, Pullman.
Meetings—Bimonthly at Mechanics Art Bldg., Pullman, Wash.

CONTRACTOR-DEALER ASSOCIATIONS

National Association of Electrical Contractors and Dealers
Chairman—W. Creighton Peet.
Secretary—W. H. Morton, 110 West 40th. St., New York.
Executive Committeemen-at-Large—W. D. Kohlwey, California; Executive Committeemen, Pacific Division—J. R. Tomlinson, Portland, J. F. NePage, Seattle, Wash.

British Columbia Ass'n Electrical Contractors and Dealers
President—E. Brettell, Vaucouver, B. C.
Secretary—Capt. W. J. Conway, Vancouver, B. C.
Meetings—First Tuesday of each month.

California Ass'n of Electrical Contractors and Dealers
President—M. A. De Lew, 180 Jessie St., San Francisco.
Secretary—J. W. Redpath, Rialto Bldg., San Francisco.
Meetings—Monthly.

Electrical Contractors and Dealers Ass'n of San Francisco
President—C. L. Chamblin, 641 Mission St., San Francisco.
Secretary—J. Stewart, San Francisco.
Meetings—Monday, 12:15; Jules Sutter Cafe.

Southern California Electrical Contractors and Dealers
President—G. E. Arbogast, 724 So. Olive St., Los Angeles, Cal.
Secretary—J. E. Wilson, 425 Consolidated Realty Bldg., Los Angeles, Cal.
Meetings—Every Friday at 6:30 p.m. at the Pin Ton Cafe, 427 South Broadway.

Monterey Bay Electrical Contractors and Dealers
President—W. Cox, Santa Cruz.
Secretary—J. A. Noggle, Monterey.

Nevada Ass'n of Electrical Contractors and Dealers
President—F. V. McAvoy, 138 N. Canter St., Reno.
Secretary—R. W. Shearer, 215 Sierra St., Reno.
Meetings—Twice a month, 15th and 30th.

Oregon Ass'n of Electrical Contractors and Dealers
President—R. C. Kenney, Portland.
Secretary—J. Willis Oberender, 301-2 Dekum Bldg., Portland, Ore.

Portland Local Ass'n of Electrical Contractors and Dealers
President—J. H. Sroufe, Jaggar-Sroufe Co., Portland.

Sacramento Section, California Electrical Contractors & Dealers' Association
President—W. H. Gribble, Sacramento.
Secretary—H. Berg, Sacramento.

Utah Society of Electrical Contractors and Dealers
President—J. V. Buckle, Buckle Electrical Co., 70 E. 1st St., Salt Lake City.
Secretary—E. H. Eardley, Eardley Bros. Co., 37 E. 1st St., Salt Lake City.
Meetings—Every Friday noon at Commercial Club.

Washington Ass'n of Electrical Contractors and Dealers
President—V. S. McKenny, NePage & McKenny Co., Armour Bldg., Seattle, Wash.
Secretary—Forrest E. Smith, Seattle, Wash.
Meetings—Quarterly—second Thursdays of March, June, September and December.

JOBBERS' ASSOCIATIONS

Electrical Supply Jobbers Association
General Secretary—Franklin Overbagh, 411 So. Clinton St., Chicago, Ill.
Meetings—Semi-annual.

Pacific Coast Electrical Supply Jobbers
President—W. S. Berry, Western Electric Company, San Francisco.
Secretary—Albert H. Elliot, 544 Market St., San Francisco.
Meetings—Quarterly.

Electrical Credit Ass'n of the Pacific Coast
President—C. L. Gilson, Gilson Electrical Supply Co., 304—12th St., Oakland, Cal.
Secretary—Albert H. Elliot, 544 Market St., San Francisco.
Meetings—annually; San Francisco; May.

OF ELECTRICAL INTEREST

California Electrical Cooperative Campaign
Chairman Advisory Committee—L. H. Newbert, 445 Sutter St., San Francisco.
Secretary—J. W. Redpath, Rialto Bldg., San Francisco.

National Electric Light Association
President—W. F. Wells, Edison Elec. Illuminating Co., Brooklyn.
Executive Secretary—T. C. Martin, 33 W. 39th St., New York City.

Nevada Section, N. E. L. A.
Chairman—Geo. A. Campbell, Reno, Nev.

Pacific Coast Section, N. E. L. A.
President—Samuel Kahn, Western States Gas & Electric Co., Stockton, Cal.
Secretary—A. H. Halloran, Journal of Electricity, Crossley Bldg., San Francisco.
Meetings—Annually, in April.

Portland Section, N. E. L. A.
Chairman—H. H. Schoolfield, Pacific Power & Light Co., Portland.
Secretary—F. H. Murphy, Portland Railway, Light & Power Company.
Mar. 11—"Work of the U. S. Engineer Department," by Col. Geo. A. Zinn.

Illuminating Engineering Society
President—George A. Hoadley.
Secretary—Clarence L. Law.
Western Representatives—Romaine Myers, Bacon Bldg., Oakland, Cal.; C. M. Masson, Edison Bldg., Los Angeles; F. H. Murphy, Portland Railway Light & Power Company, Portland, Ore.; W. R. Putnam, Utah Power & Light Company, Salt Lake City; Fred A. Osborn, University of Washington, Seattle, Wash.
Meetings—First Tuesday each month.

New Mexico Electrical Association
President—James R. Smith, Raton, N. M.
Secretary—Charles Twogood, Albuquerque, N.M.
Meetings—Annually, in February.

Southwestern Electric and Gas Association
President—W. A. Sullivan, Shreveport, La.
Secretary—H. S. Cooper, 403 Slaughter Bldg., Dallas, Texas.

Northwest Electric Light and Power Ass'n
President—H. J. Gille, Puget Sound Traction Light & Power Co.
Secretary—W. E. Herring, Puget Sound Traction, Light & Power Co.

Meetings—Convention held annually. Executive Committee, governing body of Association, meets upon call of its chairman.
New officers announced later.

Los Angeles Jovian Electrical League
President—A. E. Peat, San Joaquin Light & Power Corp.
Secretary—Frank Weiss, Los Angeles Gas & Electric Corp.
Meetings—Every Wednesday, 12 m.
Feb. 26—"The Labor Situation," by Sen. Geo. W. Cartwright.
Mar. 5—"Harbor Development," by Clarence H. Matson.

San Francisco Electrical Development League
President—Garnett Young, 612 Howard St., San Francisco.
Secretary—J. W. Redpath, Rialto Bldg., San Francisco.
Meetings—Every Monday, 12:10 p.m.; luncheon, Palace Hotel.

Electric Metermen's Association
President—J. E. Bridges, Westinghouse Electric & Manufacturing Company.
Secretary—A. E. Coney, Great Western Power Company, San Francisco.
Meetings—About every 60 days.

Alameda County Electrical Club
President—George Drew, Pacific States Electric Company, Oakland, Cal.
Secretary—George B. Furniss, Pacific Gas & Electric Company, Oakland, Cal.

Synchronous Club
Secretary—H. N. Beecher, City Hall, L. A.
Mar. 11—"Oxy-Acetylene Welding," by LeRoy Andrews.

Telephone and Telegraph Society of the Pacific Coast—San Francisco Section
President—W. H. Brammage, Pacific Tel. & Tel. Co., San Francisco.
Secretary—Chas. H. Dodson, 835 Howard St., San Francisco.

MECHANICAL ENGINEERS

National Officers
President—Mortimer E. Cooley, Electrical Engineering Dept., AnnArbor, Mich.
Secretary—Calvin W. Rice, Engineering Society Bldg., New York City.

San Francisco Section, A. S. M. E.
President—E. C. Jones, Pacific Gas & Electric Co., San Francisco.
Secretary—Geo. L. Hurst, Bethlehem Ship Bldg. Corp., Ltd., San Francisco.
Meetings—Quarterly.
Thursday lunches have been arranged at the Engineers' Club, 57 Post St.

Los Angeles Section, A. S. M. E.
President—Charles H. McGuire.
Secretary—T. J. Royer.
Meetings—Quarterly.

ENGINEERS' CLUBS

Oregon Society of Engineers
Secretary—Orrin E. Stanley, Box 973, Portland.
Meetings—Annual: Feb. 4, 1918. Monthly: Third Thursday of each month.

The Engineers' Club of Seattle
President—H. E. Horrocks, Seattle, Wash.
Secretary—E. J. Bartells, Northern Life Bldg., Seattle, Wash.
Meetings—Thursday noon at the club rooms at 410 Arctic Bldg. A buffet luncheon is served every day. A special welcome is extended to all engineers visiting the city.

Engineers' Club of San Francisco
President—A. E. Chandler, New Call Bldg., San Francisco.
Secretary—J. R. Brownell, 525 Market St., San Francisco.
Annual Meeting: October.

Idaho Society of Engineers
President—W. H. Gibson, Mountain Home, Idaho.
Secretary—Ira F. Shaffner, Boise, Idaho.

Engineers' Club of Oakland
President—R. S. Chew, Oakland Chamber of Commerce, Oakland.

Engineers' Club of Sacramento
President—George S. Nickerson, 914 Forum Bldg., Sacramento.
Secretary—P. M. Noeboe, State Department of Engineering, Forum Bldg., Sacramento.

United Engineering Societies of San Francisco
Chairman—C. D. Marx, Stanford University.
Secretary—Nathan Bowers, Rialto Bldg., San Francisco.

Joint Committee Technical Societies of Los Angeles
Chairman—George A. Damon.
Secretary—W. K. Barnard, 705-6 Central Bldg., Los Angeles.

MISCELLANEOUS

American Ass'n for the Advancement of Science—Pacific Division
President—D. T. MacDougal, Director Desert Laboratory, Carnegie Institution, Tucson, Arizona.
Secretary (acting)—J. R. Douglas, 430 Library, University of California, Berkeley, Cal.
Meetings—Annual.

Portland Section A. S. C. E.
President—P. H. Dater, Eng. U. S. Forestry Service.
Secretary—C. P. Keyser, Park Bureau, Portland, Oregon.
Meetings—At call of president.

Spokane Engineering & Technical Ass'n
President—J. C. Ralston, E. M., E. E.
Secretary—A. D. Butler, City Engineer, Spokane, Wash.
Meetings—Third Friday of each month. Joint with A. S. C. E., A. I. E. E. and A. S. M. E.

Foreign Trade Club
President—W. H. Hammer, Monadnock Bldg.
Secretary—Wm. E. Hague, Monadnock Bldg.
Meetings—238 Merchants Exchange Bldg., San Francisco. Every Wednesday evening.

Pacific Coast Gas Association
President—John D. Kuster, care Pacific Gas & Electric Co., San Jose, Cal.
Secretary—Henry Bostwick, 445 Sutter St., San Francisco.

Society for Promotion of Engineering Education
Secretary—F. L. Bishop, University of Pittsburgh, Pittsburgh, Pa.

HAPPENINGS IN THE INDUSTRY

TRADE NOTES

Sales Convention —

Fifteen Delco Light dealers of the Northwest, representing the Modern Appliance Company, 508 First avenue South, Seattle, which in turn represents the Domestic Engineering Company at Dayton, Ohio, are visiting Dayton for the purpose of attending the sales convention and for the further purpose of visiting the factory of the Domestic Engineering Company and familiarizing themselves with the new products. The fifteen delegates now attending the convention have sold sufficient Delco products to entitle them to a free trip to Dayton. These products are being extensively utilized in lighting up the dark places on the farm. Among those attending the convention are: E. H. Epperson, president of the Modern Appliance Company, Seattle, G. E. Thompson, King county representative, R. Marsh of Kamloops, B. C., H. J. Cressup of Vancouver, Wash., Charles E. Flagg of Spokane and H. A. Conger of Portland.

New Business —

The Standard Electric Company, 73 Horton street, Seattle, has just finished wiring an apartment house at Bellingham, Washington, for J. G. Hull at the contract price of $1200.

Change of Office —

The main office of the Stockton Electric Railroad Company will hereafter be at 65 Market street, San Francisco, instead of in Los Angeles.

Expansion of Business —

The Western Dry Battery Company, manufacturer of Bull Dog Dry Cells, has moved into its own two-story factory at 15th avenue West and Wheeler street, Seattle. This company began business in Seattle six years ago and has grown and expanded until the product is now sought throughout the western states and in Hawaii. The new factory has 6500 square feet of floor space. James Bennett is president and Roy Bennett manager of the company.

An Electric Service Station —

F. S. Williams and D. L. Manning have opened an electric and car service station in the D. L. Brown building, Pomeroy, Wash. The second floor has been remodeled and will be used for a display room; the first will be used as a repair shop. A large dynamo is being installed for the recharging of storage batteries. Outside wiring will also be done and the services of an electrical man of sixteen years' experience have been secured.

New Price Schedule —

A new price schedule affecting the entire line of General Electric wiring devices, except enclosed fuses and some similar material, has been announced under date of March first. The company decided that the only way immediately to remedy the present awkward system of meeting changing cost prices by reducing discounts, without making present catalogues obsolete, was to declare practically all list prices doubled and establish a new schedule of discounts from these doubled lists which gives the same net prices as are now in effect.

Union of Companies —

Arrangements have been made by The Franz Premier Company, the largest manufacturer of vacuum cleaners in the United States, with the General Electric Company, and also the Edison Electric Appliance Company, Inc., a subsidiary of the General Electric Company with headquarters in Chicago, for the formation of the General Vacuum Cleaner Corporation. Headquarters of the new company will be in Cleveland and operations carried on at the present factory of The Franz Premier Company.

The new corporation has an authorized capital of $10,000,000, a liberal portion of which will be held by the General Electric Company. Controlling interest will be held by The Franz Premier Company. The Edison Electric Appliance Company will receive an interest in the corporation in return for its vacuum cleaner business. Julius Tuteur, president of The Franz Premier Company, will be president of the new corporation. Associated with him will be eight directors, five of whom will be elected by The Franz Premier Company.

A New Montana Substation —

The Montana Power Company is building a new substation in Great Falls, located on First avenue North between 9th and 10th streets. It will handle the city distribution and being close to the center of distribution should improve the regulation on the system. Power will be supplied by the Black Eagle and Rainbow plants at 6600 volts. New equipment is being installed, and the modern equipment will be moved from the Black Eagle substation at the time of the cut-over to be made during the summer.

Personal Items —

James E. Barker of Los Angeles has opened offices at 611-615 Investment Building, Los Angeles, California, for the practice of gas, electrical and mechanical engineering.

C. R. Bach, Pacific Coast manager for the Manhattan Electrical Supply Company, returned recently from an extended trip through the Northwest including Montana, Idaho and Utah. He reports the business outlook as very bright.

LESSONS OF WAR COST FINDING

In a recent address, Wm. B. Colver, chairman of the Federal Trade Commission, tells of the lessons learned by the necessities of accurate cost finding which arose during the war. He says that from the experience of cost finding, he believes we may argue for:

(1) Standardized accounting systems, suited to the various industries.

(2) Cost and profit accounting for individual products.

(3) Reasonable standardization of products and elimination of excessive costs due to unnecessary multiplication of styles and types.

(4) Compilation and issue of current, basic trade information.

(5) Conferences between industries and Government for the exchange of proper and useful views and information.

As for the outlook there need be foresight but no fear. A period of readjustment must be met with the new and broader view. The same cooperation of industry, of labor, of capital and of Government that armed the nation for war will make it still greater in peace.

SAN JOAQUIN LIGHT AND POWER DEVELOPMENT

To avert a serious power shortage and threatened curtailment of development in the San Joaquin Valley, the San Joaquin Light & Power Corporation, which plans in the next eighteen months to spend $3,000,000 in betterments, and which applied to the California Railroad Commission for authority to make a 20 per cent increase in its base rates for electric energy, has been granted permission by the commission to add a 15 per cent surcharge to all bills, effective for all meter readings on and after Feb. 15, 1919, and for all flat-rate service after Feb. 1, 1919. The surcharge period, however, is limited to Jan. 15, 1920.

This proceeding is kept open and the commission retains jurisdiction to issue a supplemental order terminating such

surcharge whenever the revenues of the corporation shall be sufficient for the purposes specified.

The company has planned the development of a 15,000 kw. plant on the San Joaquin river, requiring an investment of $1,750,000. Extension and improvements of its existing transmission and distributing system will cost $1,250,000, or a total of $3,000,000 to be expended in the next year and a half. The company expects to get most of this money through the sale of bonds. In its petition for rate increase it claimed that because of its failure to earn a full 8 per cent it could not meet its trust deed requirements as to issuance of bonds and therefore cannot obtain the necessary money to make extensions.

SIX MILLION GALLON PUMPING INSTALLATION

Thompson & Castleton, electrical engineers, 316 First avenue South, Seattle, will complete about April 1st an interesting electrical installation at Prineville, Oregon, for the Ochoco Irrigation District. The company found it necessary to rearrange and enlarge its electrical pumping equipment. The pumps are to furnish about 6,000,000 gallons of water per day for sluicing material required in making a hydraulic fill dam which is under construction, the electrical energy for which is obtained from the Deschutes Power Company of Prineville.

The original pumping plant consisted of two Worthington 3-stage, 10-inch centrifugal turbines, operating in multiple under a 225-foot head, discharging 6,000,000 gallons of water every 24 hours, and calls for 450 h.p. figured on a kva. basis. By replacing the dismounted impellers this plant would consist of two 5-stage, 10-inch turbines, operating in multiple under the greater head required of 375 feet, handling the same volume. However this would require 750 h.p. figured on a kva. basis and this was 300 h.p. in excess of the power to be obtained at the plant of the company. To meet this emergency an auxiliary pumping plant was installed at a point midway between the present pumping plant and a new sluicing pit, to operate the two plants alternately with the power available. This calls for construction of a reservoir at the site of the midway pumping plant.

From the site of the original pumping plant the two Worthington 3-stage, 10-inch pumps are being moved to the midway site as an auxiliary pumping unit and in their stead are being installed two D'Olier 12-inch centrifugal pumps, which will be driven by a 400 h.p. synchronous motor of the Electric Machinery type, the pumps being installed in parallel to deliver 8,000,000 gal. every 24 hrs. against a 185 ft. head. The auxiliary pumps at the middle point reservoir which are driven by a Westinghouse 450 h.p. motor, will serve to force water from the reservoir direct to the sluicing giants at the pit, 150 feet above. By following the plan of operating the D'Olier 8,000,000-gallon pump on Ochoco creek every other day and by alternating with the Worthington 6,000,000-gallon pump at the middle point reservoir, the reservoir will always contain an increasing supply of water for sluicing. It will be seen that the available 450 h.p. is utilized to operate both pumping units. The sluicing and dam construction will proceed at the rate of something like 1530 cubic yards a day.

OREGON LAWS AFFECTING THE ELECTRICAL INDUSTRY

Engineer's License Bill Passed —

The senate recently revised its former action on the house bill providing for the licensing of engineers and passed that measure with an amendment providing that army engineers shall be recognized as professional engineers within the meaning of the act and shall be licensed without examination within one year after their discharge from military service. The measure creates a board of engineering examiners to consist of nine members to be appointed by the governor and provides that "After January 1, 1920, no person shall practice professional engineering without having first been duly and regularly registered by the board as a professional engineer as required by the senate act."

Regulating Practice of Architecture —

A bill authorizing and regulating the practice of architecture has been passed by the Oregon legislature with a slight modification. The bill as passed now provides that persons other than architects may prepare plans and specifications and build in accordance therewith but cannot call themselves architects or assume in any way the title of "architect."

State Payment of Interest —

An act to provide for the payment by the state of interest for a period of not to exceed five years on bonds heretofore or hereafter to be issued by irrigation or drainage districts has been passed by the Oregon legislature. The bill provides for the method of such payment of interest and repayment to the state of all moneys so paid, and for the investigation of irrigation and drainage districts by a commission.

Adequate Lighting Required —

An act has been passed by the Oregon legislature requiring owners, lessees and operators of places of employment to provide emergency and general natural and artificial lighting; defining how the minimum of light shall be established. It provides that all passageways and other portions of places of employment, and all moving parts of machinery which are not so guarded as to prevent accidents, where persons work or pass or may have to work or pass in emergencies, shall be kept properly and sufficiently lighted during working hours. All workrooms in any place of employment shall be properly and adequately lighted during working hours.

Lamps must be so located or suitably shaded as to minimize glare. All lamps and lighting appliances must be so installed in regard to height, spacing, reflectors or other accessories as to secure a good distribution of light on the work, avoiding objectionable shadows and sharp contrasts of intensity. Emergency lamps shall be provided in the main aisles and in all stairways, passageways and exits so as to afford sufficient guidance to provide the safe exit from said places of employment in case of emergency.

COMMERCIAL RELATIONSHIPS IN CHINA

A Letter to the Editor

Julean Arnold, commercial attache at Peking to whom this issue is dedicated, writes of some of the work which the American representatives are doing in China:

I am just returning to Peking after a year spent here in Shanghai as Chairman of the American Delegation to the China Tariff Revision Commission, another high sounding designation or appellation. The commission did not do all that the name tends to imply, but it did succeed in giving to China, as far as possible, an effective 5% import tariff. I had also while here the job of Field Representative and Organizer of the American Red Cross in China, which gave me an opportunity of doing a bit to help win the war, a small bit but a satisfaction, nevertheless. We have some, an ever increasingly larger number, of good Americans here in China and it's a pleasure to work with them. I managed also during the year I spent here to compile a commercial handbook on China, which is soon to be published by the Bureau of Foreign and Domestic Commerce of the Department of Commerce. I advise you to get a copy as I believe it will give you some information useful to your journal. There are a number of good articles in the handbook contributed by men who are specialists in their lines. JULEAN ARNOLD.

LATEST IN EVERYTHING ELECTRICAL

(One of the largest hydroelectric developments in the West at the Holter Plant of the Montana Power Company and other advances during 1918 are described in a review of electrical apparatus during the year. The bulk of business done in ship wiring still continues and marine wiring devices are of special interest. The description of a new switch and an instrument panel especially designed for use in measuring gas flow are further presented in this survey. —The Editor.)

NEW INSTRUMENT PANEL FOR THOMAS METERS

The Cutler-Hammer Manufacturing Company of Milwaukee has recently completed an improved design of instrument panel for use with the Thomas Meter. The earlier panels carried both the recording instruments and regulating apparatus; and in order to make possible their installation in different locations, the Cutler-Hammer Company has now mounted the instruments on a separate small panel. The total and graphic records of the gas flow can therefore be placed, with a minimum space requirement, in the superintendent's office or near the operator interested in them, and the regulator can be located convenient for inspection by maintenance men. The meter housing is of course located at a point in the pipe line where a measure of the gas flow is desirable. In accordance with the modern trend of safety first ideas, further refinements have also been made in the design of the instrument panel to make it practically fool-proof and shock-proof. The new design follows the dead front principle of switchboard construction, as the accompanying illustration shows. The top section contains the galvanometer which differs from the usual form of laboratory instrument in that the number of sensitive parts has been reduced to a minimum, and those sensitive parts that are necessary are made easily replaceable, while all other parts are made very strong and durable. The mechanism and connections are placed in an aluminum case and are arranged so that the sensitive parts are well protected but accessible. It is constructed jointly by the Leeds & Northrupp Company and the Cutler-Hammer Company. Most forms of galvanometers are placed in wooden cases and are so constructed that they do not give good service when used by unskilled mechanics.

The middle section contains the Easterline graphic watt meter which records in standard units the flow of gas through the meter housing. Below the Easterline instrument is a Westinghouse single-phase watt meter, with scale calibrated for thousands of cubic feet of gas, which shows the total gas flow. Mounted on the back of the center section is a square D knife switch, operated by a lever on the front of the section, which serves as a main line switch for the heater circuit and all control circuits. At the left of this switch is mounted a push button control switch which operates a C-H single pole remote control switch. This switch is magnetically opened and closed and mechanically locked and is used to open the heater circuit in the meter housing to permit the operator to balance the meter. The instrument panel also contains a current transformer, for all except the small size of meters, and fuses for the recording circuits and test connections for electrically testing the two watt meters. These watt meters are standard 5 ampere 110 or 220 volt instruments, hence they may be tested for accuracy in the same manner as any other standard indicating or integrating electrical instrument, that is, by connecting them in series with similar meters of known accuracy. Test constants are stamped on each meter and it is not necessary to shut off the gas or interrupt the gas measurement to test the recording and integrating instrument. All live parts are enclosed in the enclosing case upon which the sections of the panel are mounted and the complete panel is furnished with a case iron sub-base, necessitating no other work in installation than the mere lagging of the base to the floor.

NEW SQUARE D SWITCH

Extremely low price is an outstanding feature of the new switch known as the Ninety-Six Two Eleven, just put on the market by the Square D Company, Detroit, Mich. An investigation carried on by this company disclosed the fact that there is an enormous market for a switch of this type. This fact has led to production of the switch in large quantities, reducing manufacturing costs and resulting in a low selling price. The new switch is shown in the accompany illustrations.

This No. 96211 is a 30 ampere, 125 volt switch, using Edison plug fuses. The current carrying parts are enclosed in a cabinet made of 16 gauge steel. The switch is operated by a handle on the outside of the box.

The box is equipped with a hasp so that the cover may be locked, preventing access to live parts by any except authorized persons. A lock-off device permits locking the switch in the "off" position when this becomes necessary.

Considering the great demand for building equipment at this time and the universal appeal of the Ninety-Six Two Eleven, the Square D Company anticipates that present facilities for manufacturing this switch will soon be outgrown. No. 96211 bears the combined fire and accident label of the Underwriters' Laboratories.

DEVELOPMENTS IN ELECTRICAL APPARATUS DURING 1918

A Survey by the Westinghouse Electric & Manufacturing Co.

During the past year, every effort has been made to utilize existing standards in order to meet the urgent demands of the war for unusual quantities of apparatus on short periods of shipment. As a result, there has been a marked

tendency to concentrate on the perfection of details of existing apparatus instead of bringing out new lines.

All manufacturers have endeavored to increase their productive capacities in so far as practicable, by elimination of special manufacture. However, the Government has had important problems to solve, and very gratifying results have been accomplished in conducting the required research and providing special machinery for their purposes.

Submarines—Distinct contributions have been made to this particular application during the past year in the instance of both motors and control. Motors have been developed, each consisting of two armatures mounted on a single shaft, two fields, and but a single frame. Improved insulation is an important feature. Equipment for controlling these main motors has been developed, this being of the pneumatic type.

Radio—Much has been accomplished in a comparatively short length of time in the development of generators and dynamotors for use with wireless telephone systems. The generators have been used on airplanes on the Western Front. They are of the wind-driven type, and have exceptionally small dimensions and weight. Dynamotors were developed both for the army and for the navy, and several thousand have been supplied. Noise, due to vibration, is minimized by mounting these machines in flexible cradles.

Undamped sending and receiving sets for radio telegraphy were developed for the U. S. Signal Corps, and were used for instructional purposes at the various training camps throughout the country.

Merchant Marine—The application of electric motors for driving auxiliary apparatus aboard the merchant ships prior to two years ago was very limited. The tendency to drive such machines electrically has rightfully increased during the past year. Special equipment for this exacting service is now being regularly supplied.

Steel Industry—One of the noteworthy features of recent practice is the selection of large size turbine units and a more liberal policy to provide for general plant electrification.

Arc Welding—Greater progress was made in the advance of electric arc welding during the past year than any other time. It had previously been quite generally used in the railroad shops of this country, but during the past year it was used more in manufacturing establishments using iron and steel, and in shipbuilding. The Welding Committee of the Emergency Fleet Corporation has been doing a large amount of work in promoting electric welding as applied to ships and although no rivetless ships were built in this country, a large one was completed during the past year in England which was entirely electrically welded, and there is now building a 250-ton ship in which riveting is being replaced by electric welding. Electric welding also made a large advance in the field where formerly gas welding was used, due to the fact that electric welding is cheaper, does the work faster and is very much less dangerous than gas welding.

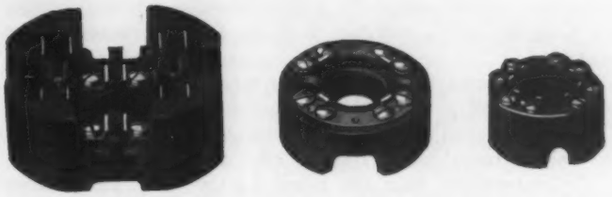
Water-Wheel Generators—The installation of the Holter Plant of the Montana Power Company is one of the largest hydroelectric developments of the West. This plant includes four 12,000-kva. vertical water wheel type generators, making a total plant capacity of 48,000 kva. The voltage is stepped up through Westinghouse transformers to 100,000-volt transmission lines, and the output distributed among the mining and metallurgical companies in Montana, and the Rocky Mountain electrified division of the Chicago, Milwaukee & St. Paul Railway.

The Eastern Michigan Power Company has placed in operation this year the largest hydroelectric development in Michigan. It is located at Wellston, is called the Junction Development, and the power plant houses three 6250-kva., vertical, 30-cycle Westinghouse generators. The voltage is stepped up to that of the transmission line, 140,000 volts, which is the highest voltage used in this country with the exception of one or two systems in Southern California.

CONNECTING BLOCK AND CARTRIDGE FUSE BASE FOR MARINE WIRING

The Bryant Electric Company of Bridgeport, Connecticut, who manufacture a comprehensive line of marine wiring devices, have ready for the market interconnecting blocks which are here illustrated and identified by catalogue Nos. 577 and 593.

These interconnecting blocks are made of unbreakable composition and provide means of making connections for branch circuits in junction boxes without the labor and difficulty of making soldered and taped tap-offs. The terminal plate binding screws are long and heavy and "staked" so that they cannot drop out and be lost. A center hole provides for wire entrance from the back of the box if necessary, and the large groove in the base permits wires to pass through under the block. The dimensions of the No. 577 are: diameter 1¾ inches, height 1 inch. The No. 593 block is 2¼ inches in diameter and 1 inch maximum height. Brass fastening screws 6-32 are furnished and kept in place by holding washers. Screw spacings are 1⅜ inches on centers, which is standard on all Bryant marine devices. The cartridge fuse base catalogue No. 576, which is also made of unbreakable composition, provides a means of fusing a circuit in a regular four-inch junction box. Binding screws are amply long, "staked" so that they cannot drop out. The hole in the center provides for wire entrance to the back of the box. As will be noted, there is ample room between the fuses for additional circuits to pass through the box. Size 6-32 brass fastening screws are furnished and kept in place by holding washers. The holes for screws are 1⅜ inches on centers, which is standard for all Bryant marine wiring devices. Dimensions of the fuse base are 3¾ inches diameter, 1⅜ inches high. National Electrical Code Standard cartridge fuses are used in this block.



576 593 577

MARINE DEVICES

With the development of the ship building industry in America, the Benjamin Electric Manufacturing Company began to offer to ship builders a very complete line of marine lighting and signaling apparatus, most of it being watertight and designed and made strictly for use under severe conditions aboard ship.

There is a line of water-tight marine lighting fixtures, both in deck and bulkhead installation. In addition to this the Benjamin Company is furnishing the merchant marine and navy with signaling apparatus, consisting of buzzers, bells and buttons all of water-tight construction. The Benjamin Company's wide experience in manufacturing lighting and signaling apparatus for oil refineries and flour mills qualifies them for the extraordinary demands for marine devices at this period. The Benjamin marine line is built up around certain basic parts in order to provide the uttermost interchangeability. Boxes, covers, globes and rings are standardized, and the spacings for supporting screws on receptacles and switches are in accordance with standard spacing of mounting bosses on various junction boxes and fixture bodies.

BOOKS AND BULLETINS

Usage of Quartz Mercury Vapor Lamps

A new publication of the Bureau of Standards, Scientific Paper 330, is entitled "The Decrease in Ultra-Violet and Total Radiation with Usage of Quartz Mercury Vapor Lamps."

In this paper experimental data are given on the decrease and intensity of the ultra violet and of the total radiation with usage of quartz mercury vapor lamps.

The measurements were made with a thermopile and a yellow (novial shade B) glass. Quartz mercury lamps, the Cooper-Hewitt, and the R. W. V. Lamp Company were examined.

It is shown that there is no marked difference in the per cent of ultra violet emitted by these lamps when new. The total intensity, as well as the ultra violet, decreases one-half to one-third in 1000 to 1200 hours.

Comparative data are taken on the ultra violet component in the radiations from the sun and from the quartz mercury vapor lamps; also data on the dye fading carbon arc lamp.

Test of Concrete Floor

Bulletin 106 of the Engineering Experiment Station of the University of Illinois gives the results of tests on a four-way reinforced concrete flat slab floor of the Western Newspaper Union Building in Chicago, Illinois, just before it was razed in 1917 to secure space for the present Union Passenger Station. The tests were conducted under the general supervision of Professor Arthur N. Talbot and the direct supervision of Harrison F. Gonnerman, Research Associate in Theoretical and Applied Mechanics in the Engineering Experiment Station.

Annual Report

The annual report to the stockholders of the Detroit Edison Company for the fiscal year ended Dec. 31, 1918, covers the general condition of the company, its financial report and a brief survey of the outlook for the coming year.

Reflectors for Outdoor Use

Bulletin 35 of the Reynolds Electric Company features Reco Reflectors for use with outdoor billboards and building signs.

Spanish Catalogue of Wiring Devices

The Cutler-Hammer Manufacturing Company of Milwaukee is distributing the 1919 edition of their Wiring Device Catalog written in Spanish. It lists and illustrates the majority of the C-H wiring devices shown in the 1919 English catalog. The Spanish catalog comprises 24 pages 8 by 10½ inches and is bound in a striking orange buff cover. It is intended for distribution to the Central and South American trade.

Industrial Gas Masks

The Bureau of Mines announces that it is making a preliminary investigation of gas masks with a view to establishing a list of approved devices for use in the mining and allied industries. After the preliminary investigation the Bureau will issue a schedule of tests which apparatus must meet in order to gain the approval of the Bureau of Mines. These investigations will be conducted at the Bureau's Pittsburgh Station by men who have had intimate connection with the development of mine rescue apparatus and gas masks used in warfare.

Boiler Logic

The Heine Safety Boiler Company, St. Louis, Mo., have just completed the printing of the latest edition of their "Boiler Logic," an 86 page treatise on steam boilers. This treatise covers the following topics:

I. Some Fundamental Considerations of Boiler Design.
   (a) Furnace Design Requirements: Mixing, Time, Temperature.
   (b) Heat Transmission from Fire by Radiation.
   (c) Heat Transmission by Convection.
   (d) Heat Transmission through tubes and to water.
II. Practical Baffling of Water Tube Boilers.
   (a) Flexibility of design.
   (b) Leakage and cost of repairs and renewals.
   (c) Active and inactive surface.
   (d) Ease of cleaning soot and ash deposits.
III. Heine Boilers for Different Fuels, Firing and Services.
   Hand Firing with Bituminous Coal — Shavings and Refuse
   Hand Firing with Anthracite Coal — Bagasse
   Chain Grate Stokers — Gas Fired
   Underfeed Stokers — Waste Heat Boilers
   Oil Fired — Dredge Boat Boilers
IV. Overloads.
V. The Boiler as a pressure vessel.
VI. Details of Construction, Heine Boilers.

Electrical Phenomena in Parallel Conductors

by Frederick Eugene Pernot, Ph. D., Associate Member A. I. E. E., Assistant Professor of Electrical Engineering, University of California, Captain Signal Reserve Corps, U. S. A.; 332 pp.; 83 illustrations; size 6 by 9 in. Published by John Wiley and Sons, Inc., New York and for sale at the Technical Book Shop, San Francisco.

Because of the considerable number of articles which have appeared here and there in the technical press for a good many years on the subject of the calculation of the electrical performance of long lines, it is a somewhat astonishing fact that a comprehensive book in the English language covering the calculation of such lines has not appeared long before 1918. It is gratifying, therefore, to find that a University of California professor has recognized the need for such a work and has produced an eminently satisfactory treatise on the subject.

It may be of interest to note the special quality of Dr. Pernot's book "Electrical Phenomena in Parallel Conductors" which, in the reviewer's opinion, sets it apart from and above the other writings which have appeared in this field. This quality is the masterly way in which the author has handled his mathematics. He has never allowed the physical and engineering aspects of the subject to become obscured by the mathematical treatment. Meanwhile, he has earned the gratitude of the reader by his full and careful development of the formulas. This is in pleasing contrast to the practice of some distinguished and mathematically inclined writers in the field of theoretical electrical engineering who are prone to substitute the good word "obviously" for much-needed elucidation. Nevertheless, Dr. Pernot quite naturally and properly presupposes that the reader has a working knowledge of the ordinary methods of the calculus and also of general alternating-current theory.

The author contends that "the aversion of the general engineering public to the hyperbolic function form of expressions (for the current and voltage at any point of a given line) is unwarranted." He contends also that the theoretically correct methods of handling the electrically long line involve no more mechanical labor than the so-called approximate methods of calculation. Both of these contentions are admirably well sustained by the arguments advanced in the book.

A striking feature of the book is the large number of accurately drawn curves and other figures illustrating the text. Another important feature is the excellence of the English used. Technical terms are clearly defined, and there is a noteworthy absence of ambiguous statements. On the other hand, the helpfulness of the book to the man who has occasional need to refer quickly to a special topic would be enhanced by the addition of an index. The omission of an index is the more readily forgiven, however, owing to the excellence of the table of contents. Within the latter, the section titles are self-explanatory to an unusual degree.

In the present volume, Dr. Pernot has given us a unique, useful, and exceedingly interesting book.

J. C. CLARK,
Associate Prof. Electrical Engineering,
Stanford University.

NEW ELECTRICAL DEVELOPMENTS

(The plans for new power development in the Pacific Central region involving work undertaken by irrigation districts, power companies and individuals, are undoubtedly the outsanding feature of this week's reports. Much industrial activity is reported from the Northwest as well as important projects under way in the Southwest and Inter-mountain Districts.—The Editor.)

THE PACIFIC NORTHWEST

OLYMPIA, WASH.—An appropriation has been made by the state senate for a preliminary survey of the Columbia river basin irrigation project.

MARSHFIELD, ORE.—The Bay Mill has installed a new shingle mill which will be operated electrically with current furnished by the Mountain States Power Company.

KLAMATH FALLS, ORE.—A bill has passed the legislature and has been signed by the governor providing for the drainage and irrigation of the Klamath marsh lands in Lower Klamath Lake.

OLYMPIA, WASH.—The public service commission has received new street car tariffs from the Washington Water Power Company of Spokane, serving notice that after March 25th the street car fare in Spokane will be seven cents.

SEATTLE, WASH.—The Allis-Chalmers Manufacturing Company, Seattle, is supplying a 40 h.p. motor to be installed in the gravel washing plant being erected at Steilacoom, Washington, by the Independent Asphalt Paving Company of Seattle.

ASTORIA, ORE.—The Pacific Power & Light Company will install one 3750 kva., 6600-volt, 3-phase steam turbo generator in the station at Astoria. The present steam boiler installation will be increased by 2000 h.p. in boilers. The new plant will represent an investment of $400,000.

PORTLAND, ORE.—The national war labor board has awarded employes of the Portland Railway Light & Power Company a horizontal wage increase of 20 per cent above the scale effective October, 1917. The award also grants the eight-hour day to linemen, construction men and several other classifications.

VANCOUVER, B. C.—Plans are being prepared by the Canadian Pacific Railway Company for the construction of a coaling plant at North Bend. The company also contemplates building a power house at Smithers, B. C., to cost including machinery about $25,000. F. W. Peters of Vancouver is superintendent.

YAKIMA, WASH.—Application is to be made to the state public service commission by the Yakima Valley Transportation Company to raise the fare on the company's city lines from 5 to 8 cents. The plan proposed includes also the sale of five tickets for 35 cents. The city lines, taking into account taxes and interest charges, showed a loss last year of about $45,000.

SEATTLE, WASH.—Gray & Barash, electrical engineers, 63 Horton street, Seattle, have started erection on property belonging to them, a 34 by 93 foot foundry building for Doran Brothers' Brass Company, with plant on adjacent property. Doran Brothers have found it necessary to expand their works, owing to the fact of a contract that will require three years to perform, in making special bronze propellers.

CHEHALIS, WASH.—At the recent city commission meeting the petition of the Washington and Idaho Water, Light & Power Company for a franchise was again rejected on the ground that the law requires such petitions to contain not only the names of the signers but also their street addresses, and for the further reason that it did not bear an affidavit claiming each signer to be a legal resident of the city.

COLFAX, WASH.—Mayor Codd has outlined a plan to the members of the city council whereby the city with a small outlay of cash would be able to generate sufficient power for pumping the city water and to run an electric light plant to light the city streets. He recommended that members of the city council consider the question of putting the city steam plant into service and taking over the pumping of the water and lighting of the city streets.

SEATTLE, WASH.—Thompson & Castleton, electrical, hydraulic and mining engineers, 316 First avenue, South, are now engaged in rewinding a 1000 kva. steam turbine set for the Ferry-Baker Lumber Company of Everett, Washington, which was burned out March 1st. They also recently finished rewinding a 600 horsepower induction motor for the Puget Sound Bridge & Drudging Company, Seattle, which has a job of hydraulic work at Port Angeles, Wash.

SEATTLE, WASH.—Independent Asphalt Paving Company, Seaboard Building, Seattle, is installing a large gravel washing plant at Steilacoom, Washington, the electrical equipment for which is being furnished by Fairbanks & Company, 550 First avenue, South, Seattle. Included in the equipment is a 40 h.p. motor which operates a 36-inch Symonds disc crusher; 25 h.p. motor operating conveyor, and 40 h.p. motor operating a 1000-gallon centrifugal pump.

VICTORIA, B. C.—Six cent fares with transfer privileges have been put into effect in Victoria, B. C. The city has been notified by A. T. Coward, local manager of the British Columbia Electric Railway Company, that the company has agreed to accept the city's proposition with a few minor amendments and that if these concessions are granted by the council the company is ready to enforce the six cent fare charges and authorize transfers instead of the five cent fare charged at present without transfers.

SEATTLE, WASH.—The City council, against the advice of City Engineer A. H. Dimock, by a vote of five to four refused to make appropriation for work on the Skagit river at any point other than Gorge Creek, although the city engineer had stated that investigations must be made at Ruby Creek and Diablo canyon in order to determine the proper kind of development at Gorge Creek. The council struck from an ordinance appropriating $35,000 for drilling operations on the Skagit river, $15,000 to be used in making borings at Ruby and Diablo.

SEATTLE, WASH.—The supreme court of Washington has upheld the legality of the proposal of the city of Seattle to purchase for the sum of $15,000,000 the street railway system of the Puget Sound Traction Light & Power Company. According to President Leonard of the traction company, there is no reason why the property should not be delivered to the city by April 1st. One of the first steps that will be taken after the traction deal is closed will be the acquiring of the lines of the Seattle & Rainier Valley Railway Company which has been under consideration for some time.

THE PACIFIC CENTRAL DISTRICT

HALFMOON BAY, CAL.—The Ocean Shore Railroad is planning to extend its line from the present terminal at Tunitas Glen to Pescadero, according to a report received here.

POINT ARENA, CAL.—The changing over of the local electric plant from steam to water power is under consideration.

BIGGS, CAL.—The trustees have decided to reduce the electric rate here from 8 cents to 6 cents per kilowatt hour. The system is owned by the municipality.

PLACERVILLE, CAL.—Extensive improvements will be undertaken by the Truckee River General Electric Company for the distribution of water for irrigation this season.

TRUCKEE, CAL.—A severe storm blocked the Truckee river during the last few days of February and there was not sufficient water to run the plant of the Truckee Light and Power Company. Consequently, Truckee was without electric lights for some time.

RIVERBANK, CAL.—The ranchmen of the immediate vicinity of Claus, located three miles south of Riverbank, are making ready to plant 1155 acres of rice this season. Nearly all the ranchers have installed from one to two pumping plants to assist in irrigating the crop.

ROSEVILLE, CAL.—The Dry Creek Rural Telephone Company's rural telephone line has opened for business with twenty subscribers. The line, which extends westward about six miles, was built as a cooperative line by the farmers and fruit growers of Dry Creek district.

WILLOWS, CAL.—The purchase of all of the properties of the Sacramento Valley West Side Canal Company and the Superior California Farm Lands Company in Glenn and Colusa counties is being considered by the farmers, and the organization of a Wright Act Irrigation District.

FRESNO, CAL.—The San Joaquin Light and Power Corporation and the Midland Counties Public Service Corporation will consolidate in the near future, according to announcement by President A. C. Balch of the Midland corporation before Railroad Commissioner H. D. Loveland.

SAN FRANCISCO, CAL.—R. T. Harding of San Francisco has applied for 30 cubic feet per second from Bucks Creek, Plumas county, tributary of North Fork, Feather River, for generating electric power for mining and manufacturing purposes. The total fall is 1400 ft., the total amount of power to be developed 4750 t.h.p.

FRESNO, CAL.—The erection of a dam across the Chowchilla immediately south of Bailey Flats has been decided upon by the East Bay Water Company of Oakland and D. C. Shelter of Los Angeles, to irrigate a 20,000-acre tract of land one and a half miles from Sharon. It is understood that the contract will be given to John S. Eastwood.

REDDING, CAL.—The Pit River Power Company has filed its articles of incorporation with the county clerk. It is capitalized for $2,500,000. It is generally supposed that the company is subsidiary to the Southern Pacific, and that it is to develop electrical power for electrifying the railroad.

WOODLAND, CAL.—The only tidewater irrigation which has ever been used in California for the production of rice is to be tried this season by the California Hindustan Rice Company. A canal 2 miles in length is to be constructed from the Sacramento river to the northern end of the holdings of the company where large centrifugal pumps will be installed.

OAKDALE, CAL.—Frank B. Pattee, Oakdale, and Samuel Bernhard, San Francisco, with J. T. Ross of Astoria, Ore., have made application for 130 cubic feet per second of the water of the north fork of Stanislaus river in Calaveras and Trinity counties, for the development of power and electric energy. The total amount of power to be developed is 9600 t.h.p.

BRANDY CITY, CAL.—Pember S. Castelman has applied for 400 cubic feet per second of the north fork of Feather river, Yuba county, tributary of Feather river, for power purposes. Diversion works consist of a concrete arch dam 145 feet high, 400 feet long on top and 50 feet long on the bottom, and a pipe line one mile long. The estimated cost of the proposed works is $85,000.

SAN FRANCISCO, CAL.—Improvements costing $232,500 are to be made on the Municipal Railways, according to a report filed with the Board of Public Works. It is planned to spend $165,000 for twenty new cars of a design now being perfected by the engineering department and the remainder for construction of a block of track on Union street, from Franklin street to Van Ness avenue.

WOODLAND, CAL.—The local manager for the Pacific Gas and Electric Company announces that prospects for 1919 are particularly bright. An additional 3000 horsepower load for irrigation is to be distributed in the county. The Alameda Sugar Company has also given notice that several pumping plants will be added and that a much larger acreage will be planted during the year to sugar beets.

FRESNO, CAL.—Delegates from nine of the districts interested in the Pine Flat dam and irrigation project met in the Fresno city hall with the Kings River Conservation Association to discuss the much agitated problem of uniting all the water districts for the purpose of putting through the big nine-million dollar Pine Flat resevoir project, which would place 400,000 more acres under irrigation.

WILLOWS, CAL.—The rice industry in this county is making a bid demand on the Northern California Power Company this year for additional current. Over fifteen hundred horsepower is asked for by new individual pumping plants alone and the greater part of these are located on lands in this vicinity. This extra load will necessitate the building of a substation in this city by the company, it is stated.

GRIDLEY, CAL.—The Sutter Butte Canal Company, of Gridley, ask for 500 cubic feet per second of the water of Feather river, Butte county, for the irrigation of 5000 acres of agricultural lands in Sutter county. The applicant proposes to install a pumping plant on Feather river to be operated by electricity or other power for the purpose of ultimately pumping 500 cubic feet per second from Feather river. But one unit of the plant will be constructed at present.

OAKDALE, CAL.—F. B. Pattee and Burton Smith, former district irrigation engineer, have asked the Oakdale Irrigation District to join in filing with them upon water rights on the north fork of the Stanislaus river. The plan outlined is to develop from ten to fifteen thousand horsepower by constructing a power house and storage reservoir on the Stanislaus just above the Utica Mine plant and to take the electricity thus generated to San Francisco and Stockton and cities along the route.

SACRAMENTO, CAL.—An election has been called to vote on the proposal to issue bonds for the construction of a new filtration plant, to cost with machinery and equipment, $1,200,000; wharf and warehouse, $150,000, and incinerator plant $143,000. If the project is carried through considerable electrical and mechanical equipment, including motors, hoisting and conveying apparatus and general transmission machinery, will be required. The proposed work will be in charge of the city engineering department.

FRESNO, CAL.—The San Joaquin Light & Power Corporation has asked for all the water of the north fork of the San Joaquin river in Madera county not now in use, not to exceed 50 cubic feet per second, between the months of March 1st and December 1st of each year, for the generation of electric power for agricultural, manufacturing, oil well pumping, lighting and domestic uses. The appropriation involves no diversion from the North Fork but contemplates the flow of all the water down said North Fork to applicant's Crane Valley reservoir.

FRESNO, CAL.—The San Joaquin Light & Power Corporation announces the immediate expenditure of $1,750,-

000 for the construction of another large power house on the San Joaquin river. The new plant will have an output of 20,000 horsepower and work is being rushed to complete it within one year from the present date. The new power house will be known as San Joaquin Plant No. 6. It will be situated on the main San Joaquin river near what is known as Macy Flat, about six miles below the present big power house.

TULARE, CAL.—The Mt. Whitney Power and Electric Company has begun work on improvements and changes in the local system which will amount to $82,000. Of this amount $60,000 will be expended in extending its power lines to accommodate the increasing demand of ranchers for power for pumping plants. Another $17,000 will be spent in converting the Tulare lines now on a two-phase 6600-volt system to a three-phase, 11,000-volt system. Five thousand dollars will be spent in adding two transformers to the substation in this city.

COLUSA, CAL.—The work of moving the Pacific Gas & Electric Company substation from Knights Landing to Wilkins Slough in Colusa county is now under way. The plant will be used for the purpose of pumping water for a large acreage in the Sutter Basin and about 5000 acres in Reclamation District No. 108. The land in lot 108 will be planted in rice and the land in the Sutter Basin will be planted to beans. As soon as the material can be assembled, it is stated that the Pacific Gas & Electric Company will begin the erection of a new substation building for the Knights Landing district.

THE PACIFIC SOUTHWEST

CALEXICO, CAL.—Joseph M. Berkeley, engineer from Los Angeles, has presented statistics and estimated cost on a municipal gas and electric plant for Calexico.

SAN DIEGO, CAL.—San Diego Consolidated Gas & Electric Corporation is erecting a 20,000 cubic foot gas holder at Escondido which, with the 10,000 cubic foot holder located there, gives the district a storage capacity of 30,000 cu. ft.

SAN BERNARDINO, CAL.—Application has been made to the board of supervisors of San Bernardino county for a 50-year franchise, to lay and operate a system of gas pipe lines and appliances, etc., within the county.

LOS ANGELES, CAL.—The San Joaquin Light and Power Corporation, Los Angeles, announces dividend No. 17 of $1.50 per share on the preferred stock was declared Feb. 13 to stockholders of record February 28, 1919, payable March 15.

LOS ANGELES, CAL.—Adding the gross operating revenue of the Los Angeles Gas and Electric Company, the income receipts and profits on sales of bonds of the Pacific Lighting Corporation, the holding company, the combined gross income for 1918 was $5,038,324, according to the report of the president.

SAN DIEGO, CAL.—Plans have been prepared by the Navy Department for the installation of a new floodlighting system at the naval coaling station at La Playa. The system, it is understood, will consist of high-power projectors with wires running to the lamps from the local power plant in submerged concrete conduits.

SAN DIEGO, CAL.—Construction work on San Diego's $5,000,000 Marine Brigade Post will be started about April 15th. Bids have been received for construction of the first group of seven barracks. Reclamation of a site embracing 732 acres will be completed by the latter part of March. Seventy-five acres are now available for construction work.

LOS ANGELES, CAL.—A 2,000,000 project for supplying water to 30,000 acres of land lying west of Los Angeles, including annexed districts of Sawtelle, Playa and Westgate and also Santa Monica, was outlined by Chief Engineer William Mulholland of the water department at a conference a few days ago. The proposition contemplates the creation of a water district covering the area referred to, such a district to vote the necessary bonds. An auxiliary trunk line will be built from San Fernando reservoir at the lower end of the aqueduct across San Fernando valley to the Westgate district, and a distributing system to be installed for both irrigating and domestic use. An estimate of the cost is about $1,950,000.

THE INTER-MOUNTAIN DISTRICT

BOISE, IDA.—Permission to charge a seven cent fare has been granted the Boise Railway Company by the public utilities commission.

LAMAR, COL.—The town officials have petitioned the State Public Utilities Commission for permission to establish a municipal electric light plant.

CUTBANK, MONT.—Preliminary plans have been completed by Joseph Seal & Son for the installation of an electric light plant in Cutbank. If the franchise is approved by the council, work will soon begin on the proposed plant.

MOSCOW, IDA.—E. C. Hall is preparing to open a general electric shop here. He will make a specialty of automobile work of all kinds and will handle the Willys-Knight line of high class electrical automobile supplies as well as other standard kinds.

KALISPELL, MONT.—Kalispell has granted a new contract for electric street lighting to the Mountain States Power Company which is to run for 35 months, and for each cluster of four 60-watt lamps the cost is to be $3.35 a month. Several new lighting districts will perhaps be created in the city in a short time.

WINNEMUCCA, NEV.—Representing a syndicate of local capitalists, John G. Taylor and Jerry Sheehan of Winnemucca have filed application to build a dam on the Humboldt river, near Stone House, for the purpose of storing 1000,000 acre feet of water. The water will be used to reclaim and irrigate 30,000 acres of alfalfa land near Winnemucca.

COEUR D'ALENE, IDA.—Preliminary work leading up to the $100,000 job of widening and deepening the head of the Spokane river at Coeur d'Alene for the purpose of draining 25,000 acres of meadow lands in the Coeur d'Alene and St. Joe river valleys has been started. It is estimated the land, now practically worthless, will be made worth from $50 to $100 per acre.

LEWISTON, IDAHO.—Plans have been outlined by F. S. Rice, mining engineer, for a hydroelectric development on the Salmon river, 35 miles from Lewiston. Water rights have been secured by Mr. Rice at Horseshoe Bend in the Salmon river, and also authority from the government to tunnel through the bend and to construct a dam to divert the flow of the river.

MILES CITY, MONT.—In the report recently submitted to the city council by J. J. McGill, superintendent of the municipal electric light plant, an expenditure of about $45,000 for improvements to the electric plant is recommended. New equipment, including an ash-conveyor, two new boilers with stokers or self-feeding apparatus and a 500 kw. generator with turbine engine, is necessary to meet the requirements for additional service.

HELENA, MONT.—Upon the ground that the street car fares granted to the Helena Light & Railway Company by the state utility commission are inadequate to enable the company to operate except at a loss, and that it lost $54,477.64 in the operation of the street car system in 1918, O. W. McConnell, manager of the company, has applied to the commission for further increases. He asks for a ten cent fare or three tickets for a quarter within the city limits and to some points outside, and a proportionate rate to other points outside the city.

THE VACUUM CLEANER — THE VACUUM CLEANER
THE VACUUM CLEANER — THE VACUUM CLEANER
THE VACUUM CLEANER — THE VACUUM CLEANER
THE VACUUM CLEANER — THE VACUUM CLEANER

A FIXED ENTERTAINMENT is all very well, but no party can be a success without the casual contributions of the guests. This is the page where the readers run the program for the moment, under the lenient supervision of our electrical janitor who impartially gathers up odds and ends left about the office from the conversations of yesterday — and here offers you some of that variety which goes to make life interesting. —The Editor.

During fishing time it is strange how many engineering problems may arise to call these power company men into the mountains. This group, however, is said to attend strictly to business. They are the officials of the San Joaquin Light and Power Cor-

poration at headquarters in Crane Valley. From right to left: A. Emory Wishon, assistant general manager; A. G. Wishon, general manager; E. A. Quinn, general superintendent; Emil Newman, engineer in charge of mountain construction work; H. H. Courtwright, manager Valley Electrical Supply Company.

Another one of those lineman's ditties which come to us from the Northwest:

HE BANE A SWADE

With a shuffling gait he stumbled in,
"Ah'm a boomer—a cook by trade;
But ah do some line work on the side."
And we thought, hay bane a Swade.

"Can you trouble shoot?" the boss inquired.
"Ay tank ay can," he replied,
"Ay's always on construction work,
But ay'm willin' ta bay tried."

He donned the hooks like a new born babe.
It would make you laugh up your sleeve.
"Ay have not climbed for most ten year."
Mack said, "That's not hard to believe."

Into the pole he chopped his spurs,
With a terrible might and main,
And out of the pole he jerked and squirmed,
Then into the pole again.

Inch by inch he mounted on,
With many a grunt and groan;
And every little way or so
He'd stop to cough and moan.

At last—through dire fatigue—he gained
The cross arm with the leads.
His body shook, and on his brow
The sweat stood out in beads.

Then like the man who, in the sea,
Grabs for the floating spar,
He grabs the arm—looks down the pole
Upon the ground so far.

With style his own and num'rous grunts,
His safety then he strapped;
His pliers from his belt he took
And both the wires he snapped.

In course of time he reached the ground;
He sighed and mopped his dome.
The way he looked, I thought that he
Felt much like going home.

Two days of toil—the strain soon told.
He thought he'd rather quit,
And go down south where wages
Were above ours just a bit.

This trouble job was new to him;
Construction he knew well.
He'd served his two years as a 'grunt'—
At least to hear him tell.

Construction gangs—we thought a bit—
Sometimes they have to eat.
A cook would remedy quite well
With corn and beans and meat.

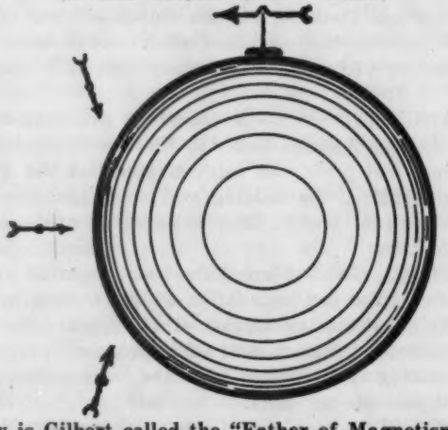
And, also, with the gang he might
Have watched them make a splice
And tie up dead-ends, when he was
Not cooking chow or rice.

With a shuffling gait he stumbled out.
He's a boomer—a cook by trade;
But he does some linework on the side.
He surely bane a Swade.

EMERSON EASTERLING.

Imagine the disgust of the English Tommy who expected to be employed in the laying of gas and water mains, but who found himself assigned to a camp kitchen. "I'm a mainsman," he said, according to the London Electrical Review, "and when I did a trade test I was told to solder a joint. I did it all right, and my papers were marked 'joint well done.' And, blimey, the next think I knew I was ordered to France as a first-class cook."

ENGINEERS OF YESTERDAY—5. GILBERT
(A Series Compiled by A. L. Jordan)



Why is Gilbert called the "Father of Magnetism"? William Gilbert, who was physician to Queen Elizabeth of England, in 1600 published his great book on magnetism. In it he makes clear the fact of the earth's magnetism, as distinct from gravitation, and illustrates it by the "terella," a small sphere of lodestone, as shown in the diagram. He notes the difference between magnetic and electric forces (he was the first to use the words "electric attraction"), the fact that iron can be magnetized by hammering it when in a north and south position, etc.

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